User Manual for the
HE300GEN250,
HE300GEN251

Genius™ Serial Bus Interface Option Card for GE AV-300i™ Adjustable Speed Drive

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PREFACE

This manual explains how to use the Horner APG's Genius™ Serial Bus Interface Option Card for GE Drives AV-300i™ Adjustable Speed Drives.

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Note: The programming examples shown in this manual are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.

TABLE OF CONTENTS

PREFACE 3
LIMITED WARRANTY AND LIMITATION OF LIABILITY 4
ABOUT PROGRAMMING EXAMPLES 4
CHAPTER 1: INTRODUCTION 7
1.1 Product Description 7
1.2 Functional Overview 7
1.3 Before Getting Started - Order of Configuration and Setup 8
1.4 Required References and Resources 9
CHAPTER 2: DRIVE OVERVIEW 11
2.1 General 11
2.2 Two Versions of SBI Cards Available / Using an Additional Option (DGF Card) 11
2.3 High and Low Priority Communication Channels 11
2.4 DGF Parameters 12
CHAPTER 3: GEN250/251 COMMUNICATIONS (SBI CARD) 13
3.1 GEN250/251 Operation 13
3.2 Automatic Data Transfer 13
3.3 GEN250/251 to/from GBC Communication using Global Data 13
3.4 SBI (GEN250/251) Configuration Procedures using GE Toolbox Software 14
3.4.1 Initial Steps Before Starting Configuration 14
3.4.2 SBI (GEN250/251) Configuration Procedures 15
CHAPTER 4: GENIUS COMMUNICATIONS 29
4.1 Introduction to Genius 29
4.2 Network Architecture 29
4.3 Genius Communications Services 30
4.4 I/O Service 30
4.5 Global Data 30
CHAPTER 5: PLC CONFIGURATION 31
5.1 General 31
5.2 Series 90-70 Configuration 31
5.3 Series 90-30 Configuration 33
a. Device Type 34
b. Input References (Input 1 Ref, Input 2 Ref) 34
c. Input Length (Input 1 Len, Input 2 Len) 34
d. Output References (Output 1 Ref, Output 2 Ref) 35
e. Output Length (Output 1 Len, Output 2 Len) 35
CHAPTER 6: AV-300i DRIVE PARAMETERS 37
6.1 Drive Parameter Descriptions 37
CHAPTER 7: WIRING DIAGRAMS 39
7.1 Genius Wiring: 39
7.2 RS232/RS485 Pinout: 40

CHAPTER 8: INSTALLATION OF GEN250/251 OPTION CARD 41
8.1 General 41
8.2 GEN 250 Installation 41
8.2.1 Installation Hardware 41
8.2.2 Installation Procedures 41
8.2.3 Cover Removal 41
8.2.4 Housing Removal 42
8.2.5 Regulation Card Removal 43
8.2.6 Mounting the GEN250 Card 43
8.2.7 Re-assembly 45
8.3 GEN 251 Installation 48
8.3.1 Installation Hardware 48
8.3.2 Installation Procedures 48
CHAPTER 9: GEN250/251CARD LED INDICATORS 51

CHAPTER 1: INTRODUCTION

1.1 Product Description

The Genius™ Serial Bus Interface Option Card for GE AV-300i™ Adjustable Speed Drive (HE300GEN25**0**/25**1**) is a Genius Serial Bus Interface (**SBI**) that resides *internally* within the drive (**GEN250**) or is located *externally* to the drive (**GEN251)**. The GEN250/251 allow communication over a Genius Network by providing a communication port between an AV-300i drive and a master device (such as a Genius Bus Controller), which is located in a PLC.

1.2 Functional Overview

Figure 1.1 depicts a functional overview of the major devices used with the GEN250/251 in a Genius Network.

1. To allow communications between the Genius Bus Controller (**GBC**) in the PLC and the AV-300i drive, specific parameters must be the same for the GEN250/251 as the GBC. Parameter information is configured and loaded into the GEN250/251 via a **PC**. This is accomplished using the **GE Control System Toolbox Software Configuration Tool**.

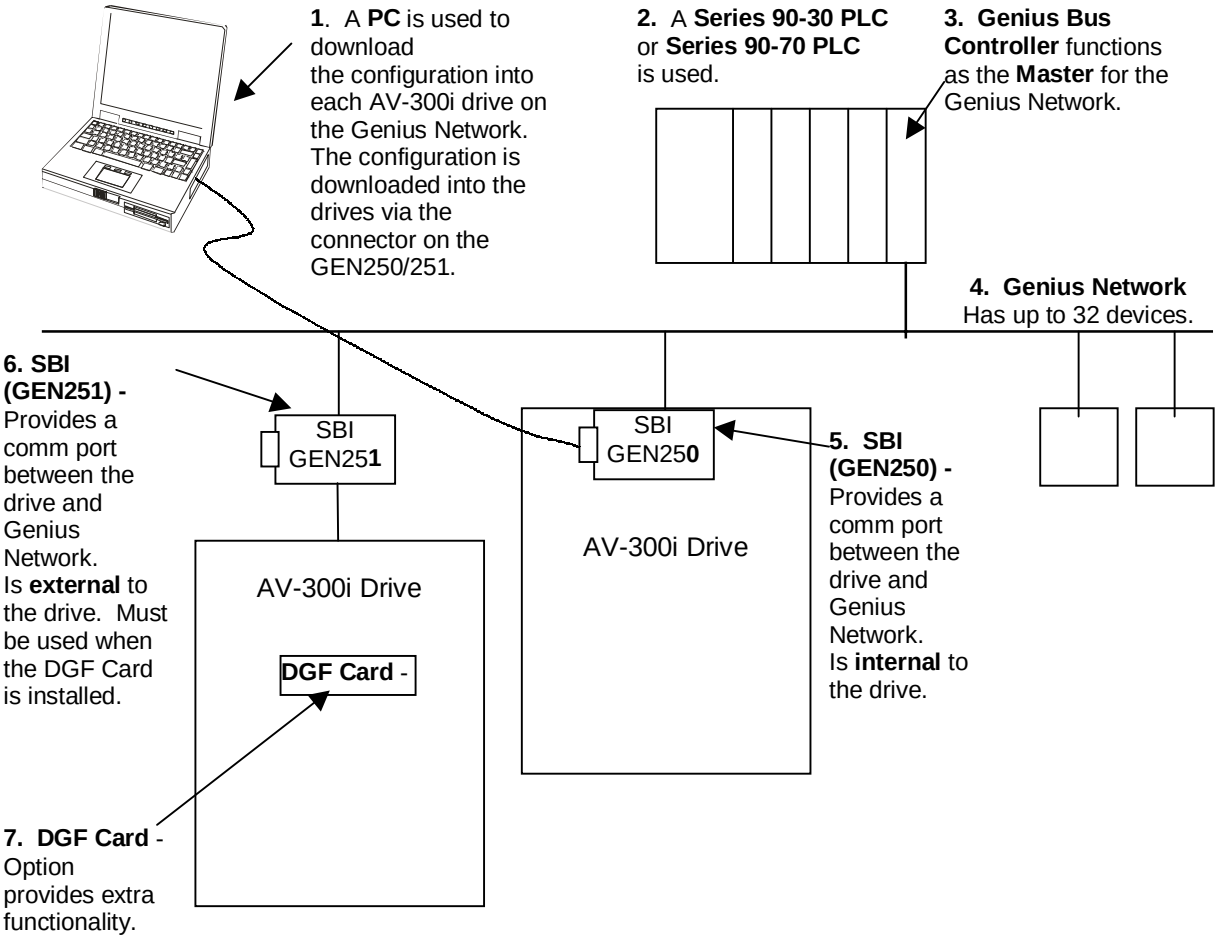

1. A PC is used to download the configuration into each AV-300i drive on the Genius Network. The configuration is downloaded into the drives via the connector on the GEN250/251.
2. A Series 90-30 PLC or Series 90-70 PLC is used.
3. Genius Bus Controller functions as the Master for the Genius Network.
4. Genius Network Has up to 32 devices.
6. SBI (GEN251) - Provides a comm port between the drive and Genius Network. Is external to the drive. Must be used when the DGF Card is installed.
SBI GEN251
SBI GEN250
5. SBI (GEN250) - Provides a comm port between the drive and Genius Network. Is internal to the drive.
AV-300i Drive
AV-300i Drive
DGF Card -
7. DGF Card - Option provides extra functionality.

Figure 1.1 – Overview of GEN250/251 in a Genius Network

2. – 4. A **PLC** is the main controlling element of the Genius Network and contains **the Genius Bus Controller** (GBC) module, which functions as the master for the Genius Network. Communications over the Genius Network are coordinated via the master device. The GBC serves as an interface between the PLC and the Genius Network. The **Genius Network** contains up to 32 devices.

5. – 6. The **GEN250/251** allow communications over a Genius Network by providing a communication port between an AV-300i drive and a master device such as a Genius Bus Controller (GBC), which is located in a PLC.

The GEN250/251 serve as Serial Bus Interfaces (SBI) and are GENA based. Thus, the GEN250/251 are slave only Genius communications devices and can not control other devices on the Genius bus. They also can not look at other device data. Communication is accomplished using the standard Genius format by sending **Broadcast (Global) Data** *to* the GBC and listening to **Directed Control Data** *from* the GBC. The GEN250/251allow up to 32 words of Broadcast Data and up to 16 words of Directed Data to be configured per drive.

The GEN250 and the GEN251 have identical functions but differ physically. The GEN250 is placed *internally* within the AV-300i drive. The GEN251 is *externally* mounted outside of the AV-300i drive. The reason for the external mounting capability is that some applications require the installation of an additional option card (**DGF Option Card**) in the AV-300i drive where a GEN250 is typically inserted. Thus, the GEN251 can be used as an interface in such cases, because it is external to the AV-300i. (**The DGF Option Card is discussed in Chapter Two.)**

1.3 Before Getting Started - Order of Configuration and Setup

This manual covers several procedures involving various devices that must be configured and setup. Although not required, the following order is suggested to setup and configure the GEN250/251 and other related Genius devices in an orderly and efficient manner.

1. Analyze the specifications and requirements of the application.

> **Note:** Refer to **Section 1.2** for a functional overview of a Genius Network containing the GEN250/251 modules in this user manual **(Horner Genius™ Serial Bus Interface Option Card for GE AV-300i™ Adjustable Speed Drive user manual [MAN0308]).** It is also recommended to read **Chapter 4** which covers elements applicable to Genius Communications.

2. Become familiar with the parameters listed in the **GE Industrial Control Systems AV-300i Adjustable Speed Drives Instruction Manual** *before* starting any configuration procedures.

a. Determine which parameters must be used to meet the requirements and specifications of the application. *Required parameters must be determined before starting configuration procedures for the SBI (GEN250/251).*

> **Note:** There is a chapter in GE's manual that provides **Parameter Lists** and includes tables that list the parameters in *alphabetical order* and *numeric order*. Each table provides different information about the parameters, which is needed for configuration.

b. Determine which of the required parameters need to be **high priority** or **low priority** when communicating with AV-300i Drive. High priority parameters can be accessed much more quickly than low priority parameters. There is a limit of six high priority parameters. **(**See **Chapter 2** for information covering high and low priority parameters in this user manual **(Horner Genius™ Serial Bus Interface Option Card for GE AV-300i™ Adjustable Speed Drive [MAN0308].** Also recommended is **Chapter 6**, which provides additional information about drive parameters.**)**

3. Install the SBI Card (GEN250/251) into the AV-300i Drive. **(See Chapter 8 for procedures.)**

4. Wire the Genius Network and the SBI Card (GEN250/251). **(See Chapter 7 for wiring diagrams.)**

5. Configure the SBI (GEN250/251) using GE Control System Toolbox Software. Upon completing the configuration, information is provided that is useful to know for configuring the Genius Bus Controller (GBC) and for writing the Ladder program. (**See Chapter 3 for GEN250/251 configuration procedures.)**

> **Note:** It is highly recommended that the user refer to the **GE Control Toolbox Help File** at this time to obtain highly useful information regarding the Genius Network Configuration**.** Select **Help,** click on **Contents,** click **Index tab,** and type **Genius Configuration.**

6. Configure the Genius Bus Controller (GBC) using Logicmaster 90. Using summary screen information from the GEN250/251 configuration, determine the **Global Data** length and the **Directed Control Data** length as well as baud rate and network id information. **(See Chapter 5.)**

7. Write the Ladder program and refer to the summary information in the GEN250/251 configuration.

1.4 Required References and Resources

This manual is to be used in conjunction with the in **GE Industrial Control Systems AV-300i Adjustable Speed Drives Instruction Manual**, the **GE Control System Toolbox software configuration help file**, and the **GE Fanuc Genius™ I/O System and Communications User Manual**.

NOTE: It is highly recommended that the user refer to the GE Control Toolbox Help File at this time to obtain highly useful information regarding the Genius Network Configuration**.** Select **Help,** click on **Contents,** click **Index tab,** and type **Genius Configuration.**

NOTES

CHAPTER 2: DRIVE OVERVIEW

2.1 General

It is important to have a basic understanding of how the AV-300i Drive interacts with the Genius Serial Bus Interface (SBI) such as the GEN250/251.

2.2 Two Versions of SBI Cards Available / Using an Additional Option (DGF Card)

There are two versions of the SBI card - the *internally* mounted GEN**250** and the *externally* mounted GEN**251**.

Note that there instances when the user needs to use both an SBI card as well as a separate option called a **DGF card**. Only one option card (either the GEN250 internal SBI card or the DGF card) can be installed **within** the drive. If the application requires *both* an SBI card and a DGF card, the DGF card must be mounted *internal* to the drive. In this case, the GEN251 SBI card must be mounted *external* to the drive. If the application does not require a DGF card, either the GEN250 SBI card or the GEN251 SBI card can be used.

The SBI provides a communications path between itself and the drive. The SBI can access any predefined parameter within the AV-300i drive. Reference the AV-300i instruction manual for a description of each of the available drive parameters.

2.3 High and Low Priority Communication Channels

The SBI provides two communications channels to and from the drive, high priority and low priority. A maximum of 16 directed control word parameters and 32 global data word parameters are allowed. Of these, up to 6 can be assigned to the high priority channel. The balance must be assigned to the to the low priority channel. All parameters assigned to the high priority channel are exchanged with the drive every 2 milliseconds. The drive can also pack/unpack up to 16 high priority bit parameters into/from a single high priority word parameter. If this feature is used, 5 high priority word parameters and 16 high priority bit parameters can be processed. Due to the relatively small number of parameters available in the high priority channel, these parameters should be reserved for the most critical parameters.

To access each low priority parameter, the SBI must poll the drive one parameter at a time. This process is very time consuming. A minimum of 100 milliseconds is required to access each drive parameter. The SBI can also pack/unpack up to 16 low priority bit parameters into/from a single low priority word parameter.

2.4 DGF Parameters

The DGF provides an additional group of low priority parameters independent of the drive's parameters. The only way to directly access the DGF parameters is via the low priority communications channel.

CHAPTER 3: GEN250/251 COMMUNICATIONS (SBI CARD)

3.1 GEN250/251 Operation

Automatic Data Transfer is a type of Genius communication that can be used between the Genius Bus Controller (GBC) and the SBI.

The automatic data transfer type of communication uses broadcast (global) data to transfer information from the GEN250/251to the GBC, and directed control data to transfer information from the GBC to the SBI. With this data type, the GBC is always communicating with the SBI.

3.2 Automatic Data Transfer

To communicate with Genius using Automatic Data Transfer, all of the required parameter information previously discussed in the Drive Overview section (the global data to transfer information from the SBI, and Directed Control Data to transfer data from the GBC to the SBI) must be configured and loaded into the SBI.

The GEN250/251 configuration is accomplished using the GE ToolBox software configuration tool. The configuration portion consists of the Genius bus configuration parameters and two memory maps, the global data memory map, and the directed control data memory map. The memory maps associate parameter names (or parameter numbers) and other parameter information with corresponding Genius data words. The GE ToolBox configuration tool uses “pick lists” for choosing parameters. The pick lists change depending on which access method is chosen. This eliminates the need to manually determine all of the information described in the Drive Overview section.

The global data memory map contains a parameter name (or parameter number) and other parameter information for each global data word from the drive to the GBC. The directed control data memory map contains a parameter name (or parameter number) and other parameter information for each directed control word from the GBC to the drive. Once the memory maps are created using GE ToolBox, they are downloaded into the GEN250/251 non-volatile memory.

The software configuration tool is setup in such a manner so that when the user chooses a parameter from the “picklist”, that parameter is set at that global data word or directed data word. When the GEN250/251scans a configuration, it separates the high priority words and the low priority words and stores them in two different arrays.

3.3 GEN250/251 to/from GBC Communication using Global Data

After the configuration is downloaded from the configuration tool to the SBI, the GEN250/251 then configures the drive. The drive must be made aware of all of the high priority parameters (both Word and Bit) that need to be passed between itself and the GEN250/251.

High priority parameters are passed automatically between the drive and the GEN250/251 every 2 milliseconds.

Low priority parameters are polled by the GEN250/251 as fast as the low priority communications channel allows. Each directed data parameter is individually polled, and then each global data parameter is individually polled; this sequence is repeated indefinitely. The greater the number of low priority parameters that are configured, the longer this polling process takes. The time required for the GEN250/251 to poll one low priority drive parameter is greater than 102 milliseconds.

WARNING: If using the Toolbox on-line diagrams, the low priority parameters between the SBI and the drive may cease to function. This is of concern, because the drive may stop updating low priority parameters when on-line diagrams are displayed. This includes the reporting of the **Bus Loss Alarm**.

3.4 SBI (GEN250/251) Configuration Procedures using GE Toolbox Software

3.4.1 Initial Steps Before Starting Configuration

Note: It is important to consult Section 1.3 prior to configuration. Section 1.3 provides a suggested order for configuration and setup and contains a detailed list of resource information.

1. Prior to configuration, analyze the specifications and requirements of the application. Become familiar with the parameters listed in the **GE Industrial Control Systems AV-300i Adjustable Speed Drives Instruction Manual** *before* starting any configuration procedures.

a. Determine which parameters must be used to meet the requirements and specifications of the application. *Required parameters must be determined before starting configuration procedures for the SBI (GEN250/251).*

b. Determine which of the required parameters need to be **high priority** or **low priority** when communicating with AV-300i Drive. High priority parameters can be accessed much more quickly than low priority parameters. A maximum of six high priority Directed Control Data parameters and six high priority Global Data parameters can be configured for each AV-300i.

3. Install the SBI Card (GEN250/251) into the AV-300i Drive. **(See Chapter 8 for procedures.)**

4. Wire the Genius Network and the SBI Card (GEN250/251). **(See Chapter 7 for wiring.)**

5. When configuring the AV-300i/HE300GEN250, there is terminology that must be understood. **(See Chapter 6.)**

3.4.2 SBI (GEN250/251) Configuration Procedures

In this configuration example, the user followed the steps in Section 3.4.1 and has predetermined which parameters and priorities to choose for the two types of data in Genius – Directed Control Data and Global Data.

To configure for **Directed Control Data**, the parameter for **Word0** is going to be "Discrete Bit Word," and the parameter for **Word1** is going to be "Speed ref 1." The user is going to select the words to be **high priority**. The user must configure the bits as well. **Bit0** is going to be "Enable Drive," and the parameter for **Bit1** is going to be "Start/Stop." To configure Global Data, the user employs the similar procedures although the desired parameters and priorities can vary.

1. Install **GE Control System Toolbox Software** by following the manufacturer's instructions.After openng the GE Toolbox Software, the following screen appears. Select **File, New**.

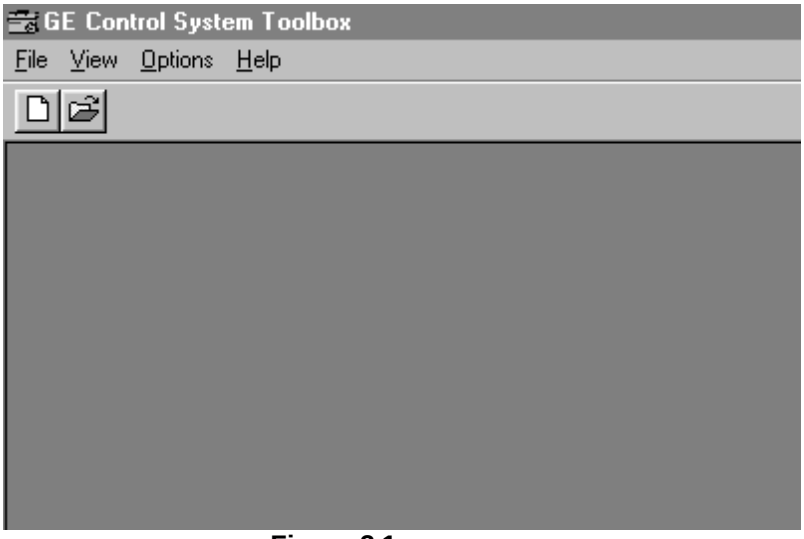


Figure 3.1

2. The following screen appears. Select AVDV Series Drive and press **OK**.

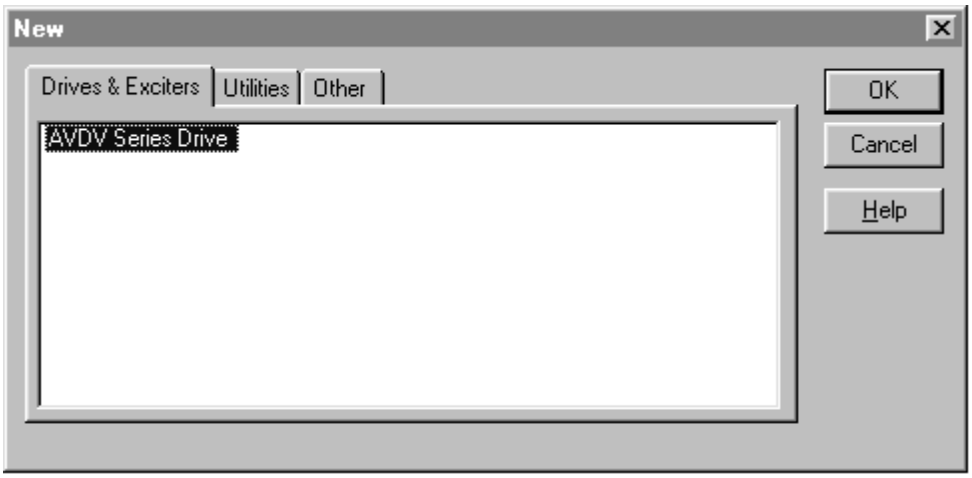


Figure 3.2

3. The following screen appears. Select the AV-300I AC drive type and drive firmware version. Note that there can be other drive information listed on this screen.

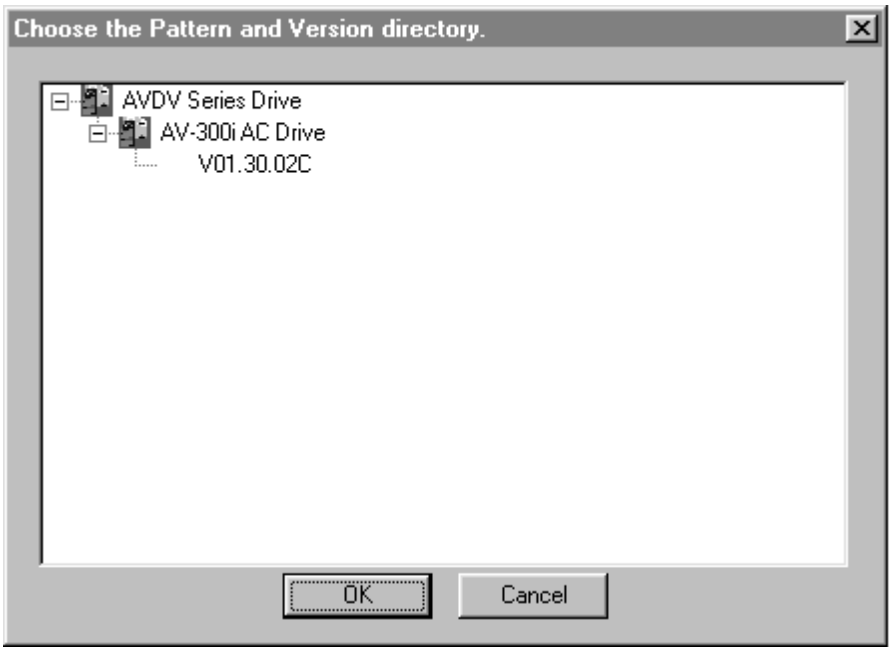


Figure 3.3

4. Type in the User ID such as the user's initials. Press **OK**.

Figure 3.4

5. Select the desired drive. In this configuration example, the 6KAVI43F75 model is selected. Press **OK**.

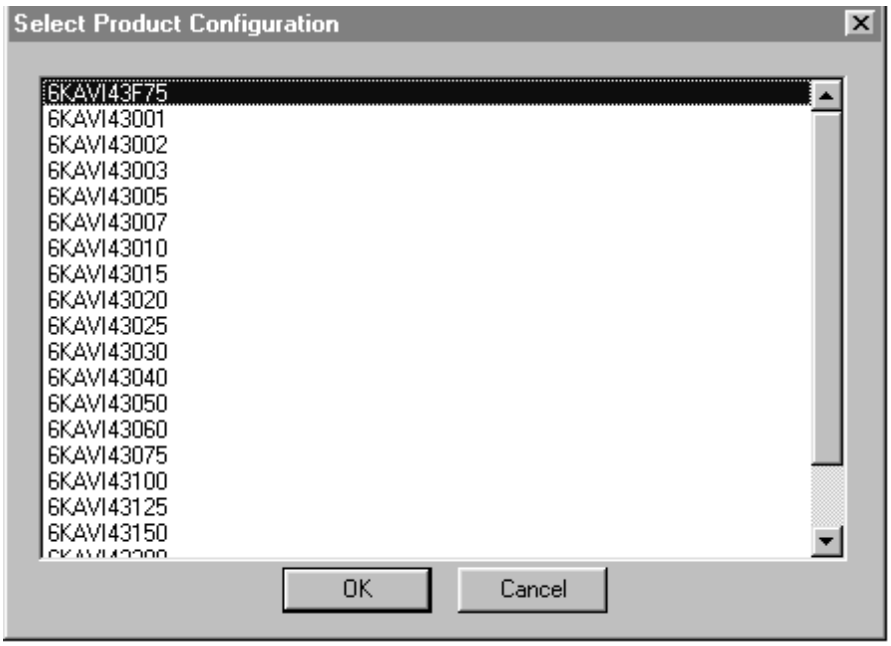


Figure 3.5

6. The following screen appears. This step requires the user to name the configuration file for the drive that is being configured. It also requires that the user select the Genius network.

In this example, the drive configuration name is AVDV1. If a different drive name is desired (such as AVDV2), double-click on the highlighted name (or right-click on the name and select **Modify**).

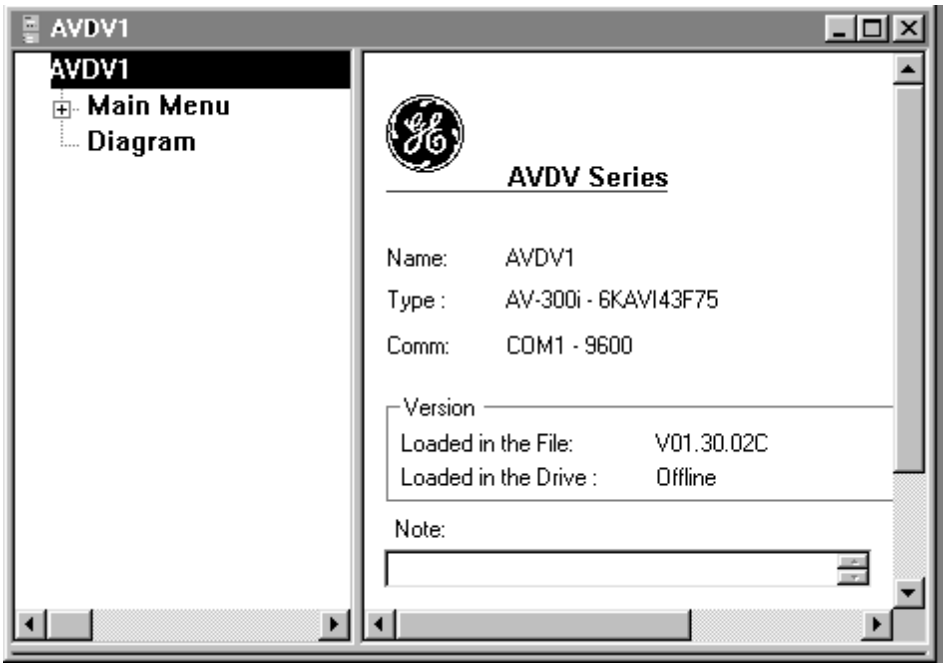


Figure 3.6

7. The following screen appears. Type in the drive name in the Name block, and from the Network block, select **Genius** from the pull-down menu. Press **OK**.

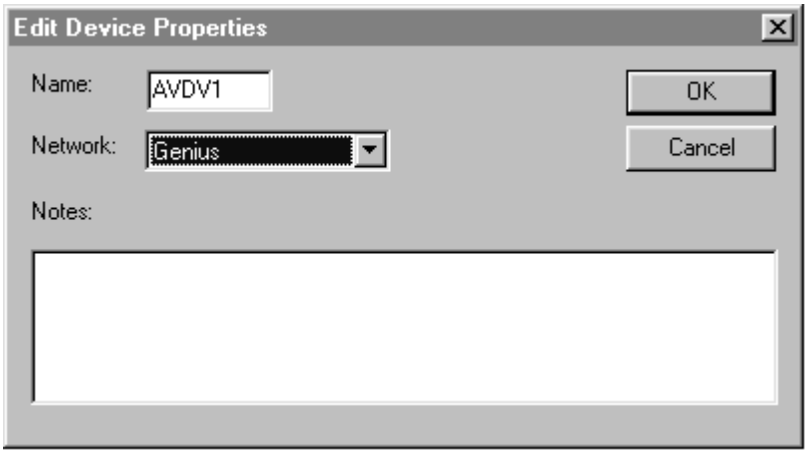


Figure 3.7

NOTE: It is highly recommended that the user refer to the **GE Control Toolbox Help File** at this time to obtain highly useful information regarding the Genius Network Configuration**.** Select **Help,** click on **Contents,** click **Index tab,** and type **Genius Configuration.**

8. The following screen appears. On the left side of the screen. a “tree” appears. Note that the Genius network is now listed as a part of the tree. The right side of the screen provides a status page that correlates to whatever item is highlighted on the “tree.”

Place the cursor on the Expand Box located in front of the word “**Genius**” on the left-side of the screen and click the box to reveal the items associated with Genius configuration.

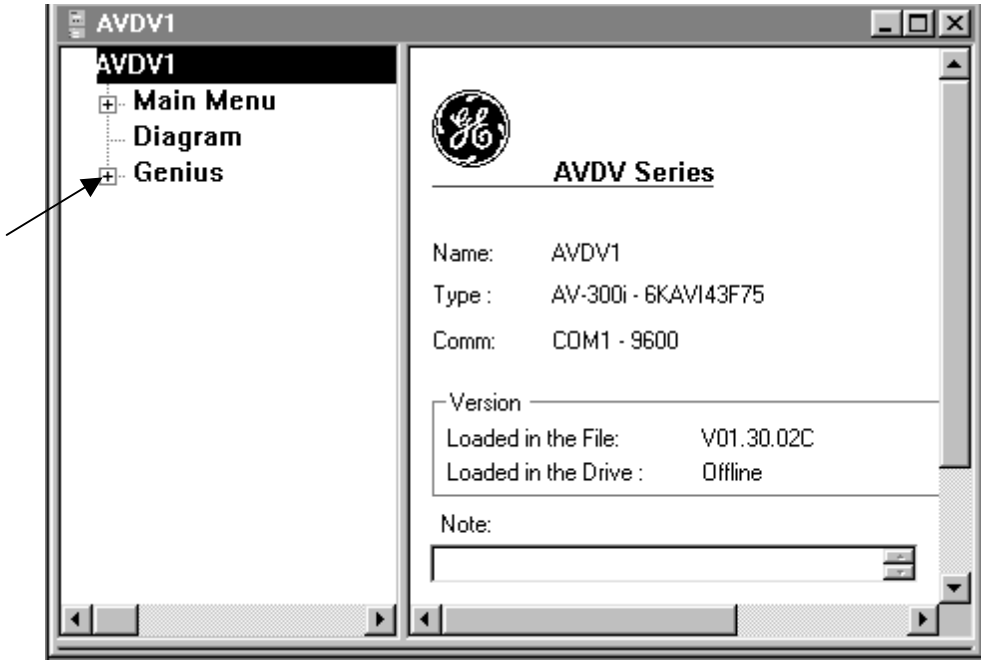


Figure 3.8

9. The following screen appears.

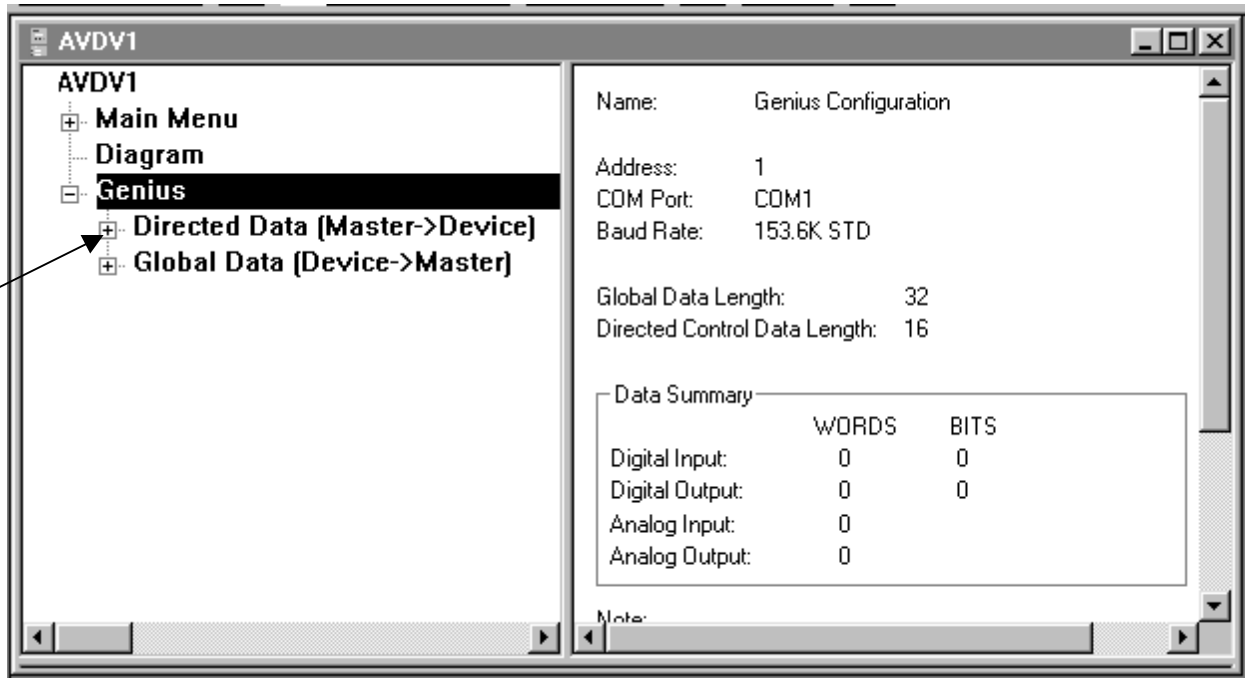


Figure 3.9

Figure 3.9 indicates the types of data that must be configured in a Genius Network. The data types include **Directed Data** and **Global Data**. To see the items that must be configured for each data type, place the cursor in the Expand box located in front **Directed Data** and click. Then, do the same thing for **Global Data**.

In this configuration example, the user followed the steps in Section 1.3 and predetermined that he/she is going to configure the Directed Data and select parameters for specific Words and Bits.

The parameter for **Word0** is "Discrete Bit Word," and the parameter for **Word1** is "Speed ref 1." The user is going to select the words to be **high priority**. The user must configure the bits of the Discrete Bit Word as well. **Bit0** is "Enable Drive," and the parameter for **Bit1** is going to be "Start/Stop." To configure Global Data, the user employs the same procedures to select desired parameters and priorities.

NOTE: It is highly recommended that the user refer to the **GE Control Toolbox Help File** at this time to obtain highly useful information regarding the Genius Network Configuration**.** Select **Help,** click on **Contents,** click **Index tab,** and type **Genius Configuration.**

10. The following screen appears.

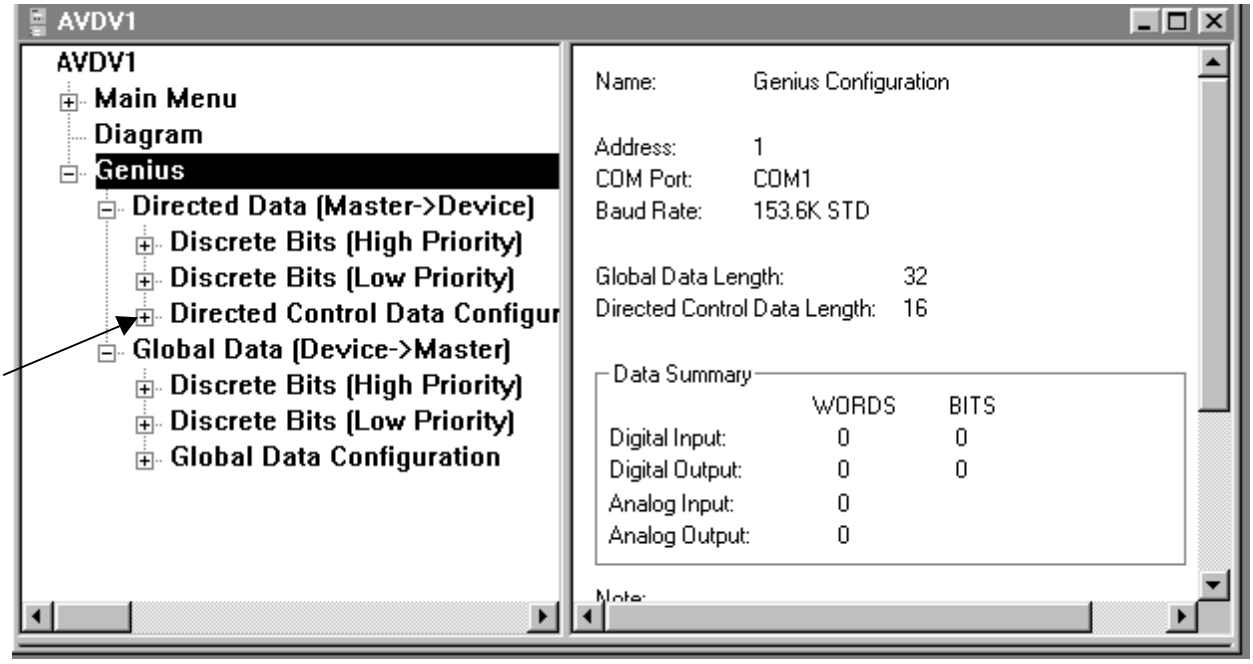


Figure 3.10

Directed Data and Global Data have three sub-items that can be configured.

Be sure to read the suggestions in **Section 1.3.** It is important to know in advance which drive parameters and priorities are going to be selected in the next steps of the configuration procedures.

Place the cursor into the Expand box located in front of **Directed Control Data Configuration** and click.

Note: The following procedures apply to **Global Data Configuration** as well. The parameters used differ however.

11. Choose a Word to configure by double-clicking on the desired word (or right-click on the word and select **Modify**).

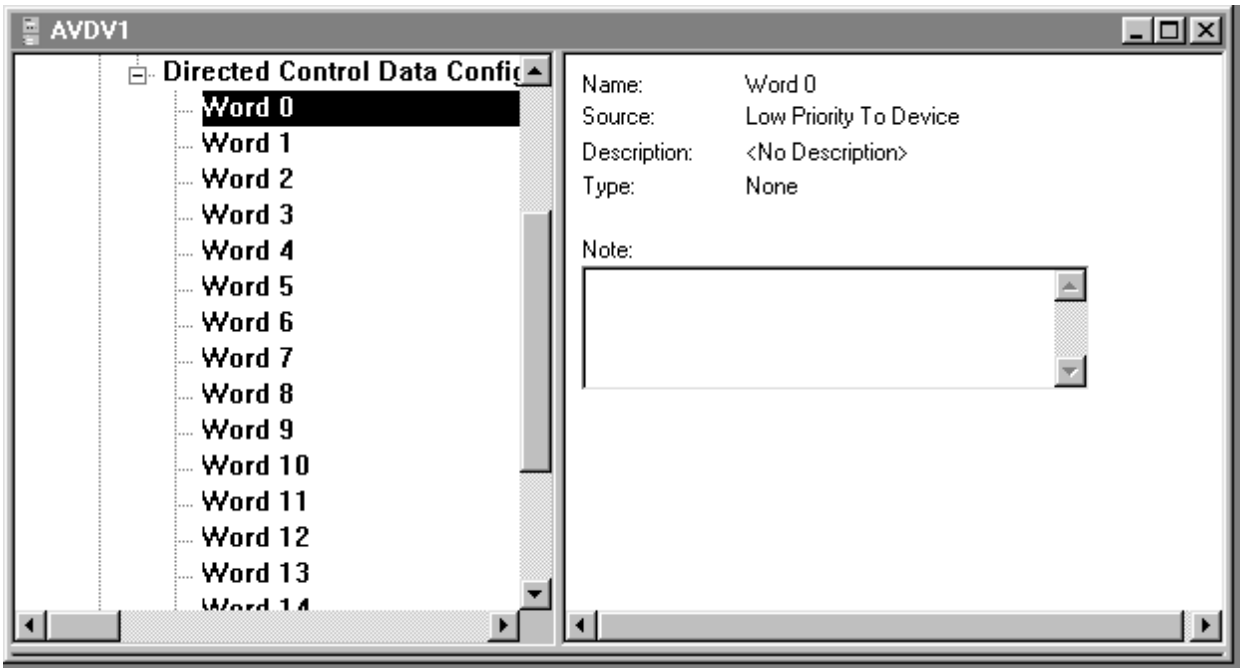


Figure 3.11

12. The following screen appears. Select a **source** and **description** using pull-down menus. Press **OK**.

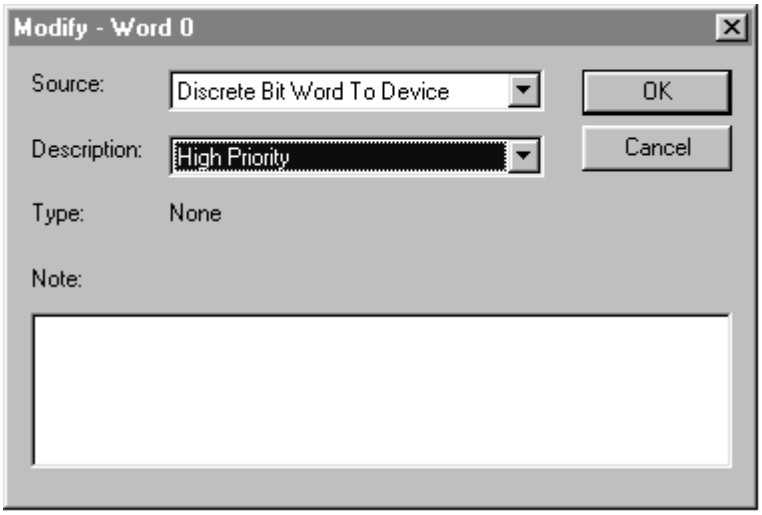


Figure 3.12

I

For this example, the user is going to assign “high priority” to the Discrete Bit Word. Thus, the selected source is **Discrete Bit Word to Device**. A description must be assigned as **High Priority**.

Note: Because the user made the selections shown on Figure 3.12 screen, one of the high priority words is used up. This means that there are 5 words remaining that can be assigned as high priority. (In Directed Data, there are 16 total words. Global Data has 32 possible words.)

13. The following screen appears.

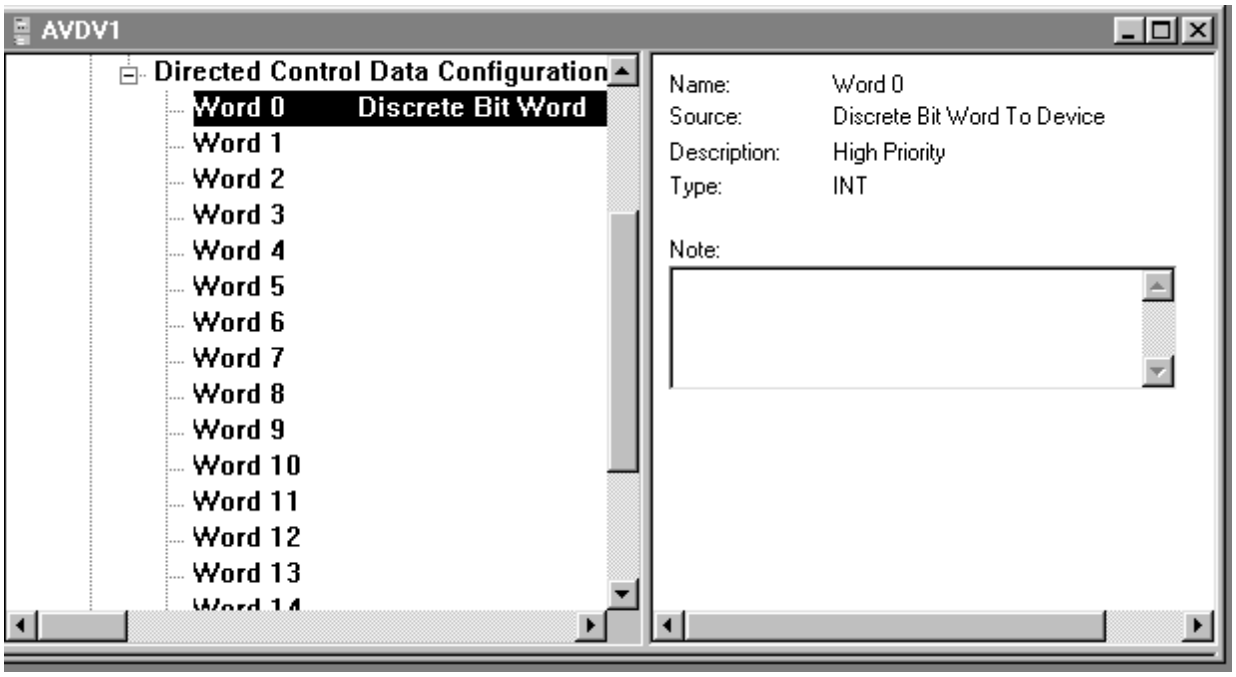


Figure 3.13

The status of Word 0 is depicted. Follow the same procedure to configure other Words. Figure 3.14 depicts selections made to Word 1.

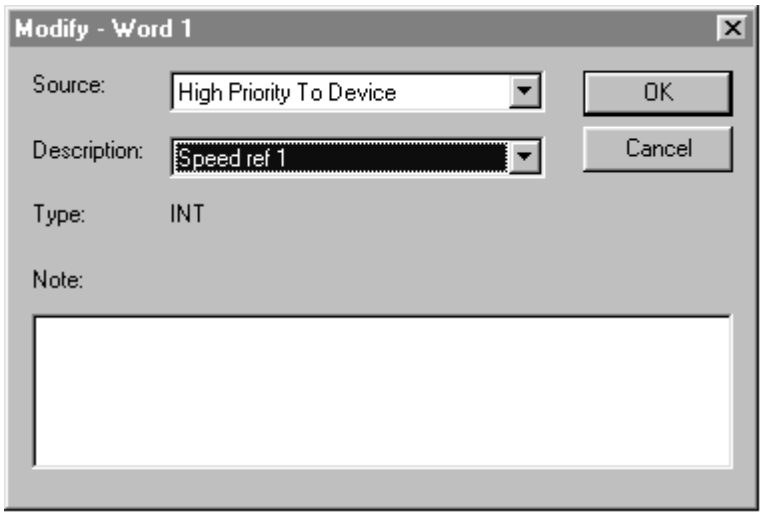


Figure 3.14

14. Figure 3.15 depicts the status of Word 1. To **exit** out of the **Directed Control Data Configuration**, click on the Collapse Box in front of **Directed Control Data Configuration**.

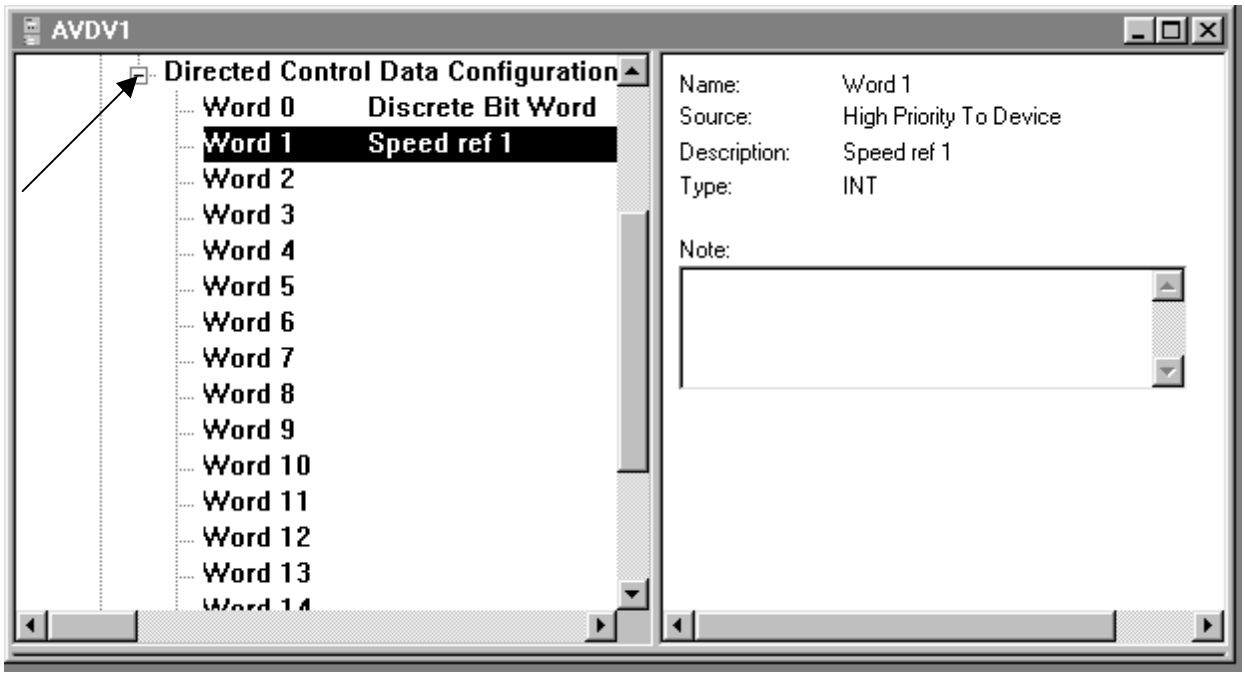


Figure 3.15

15. The following screen reappears. Place cursor on the Expand box in front of **Discrete Bits High Priority** and click.

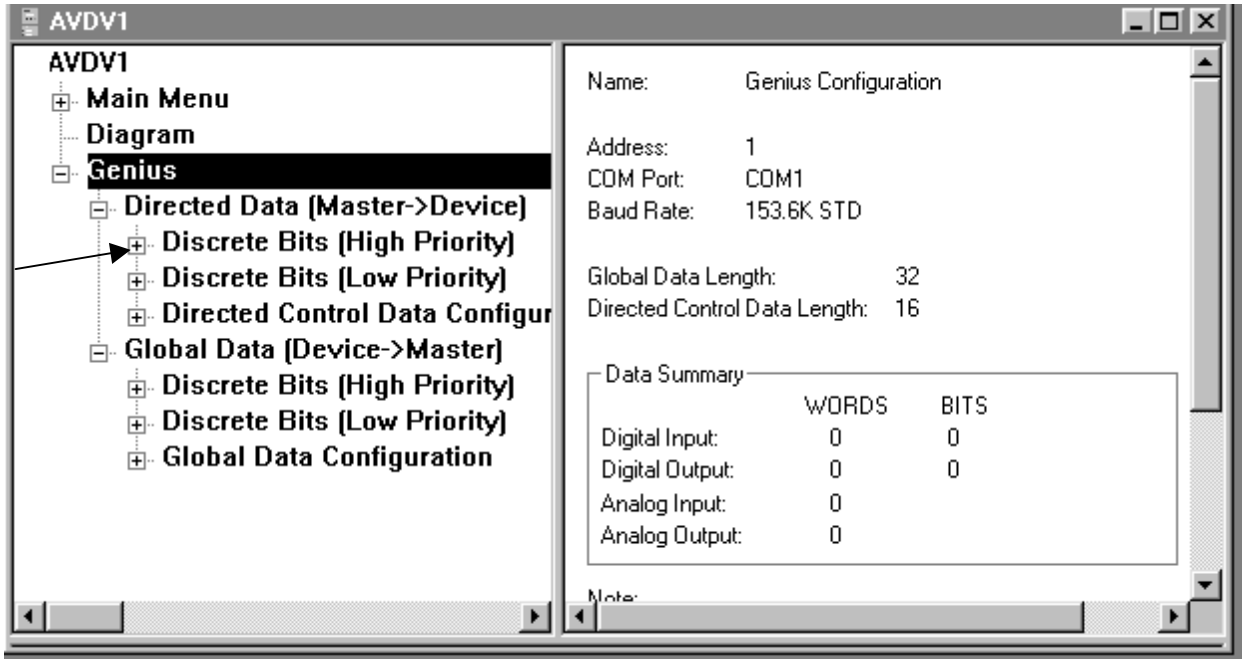


Figure 3.16

16. The following screen appears.

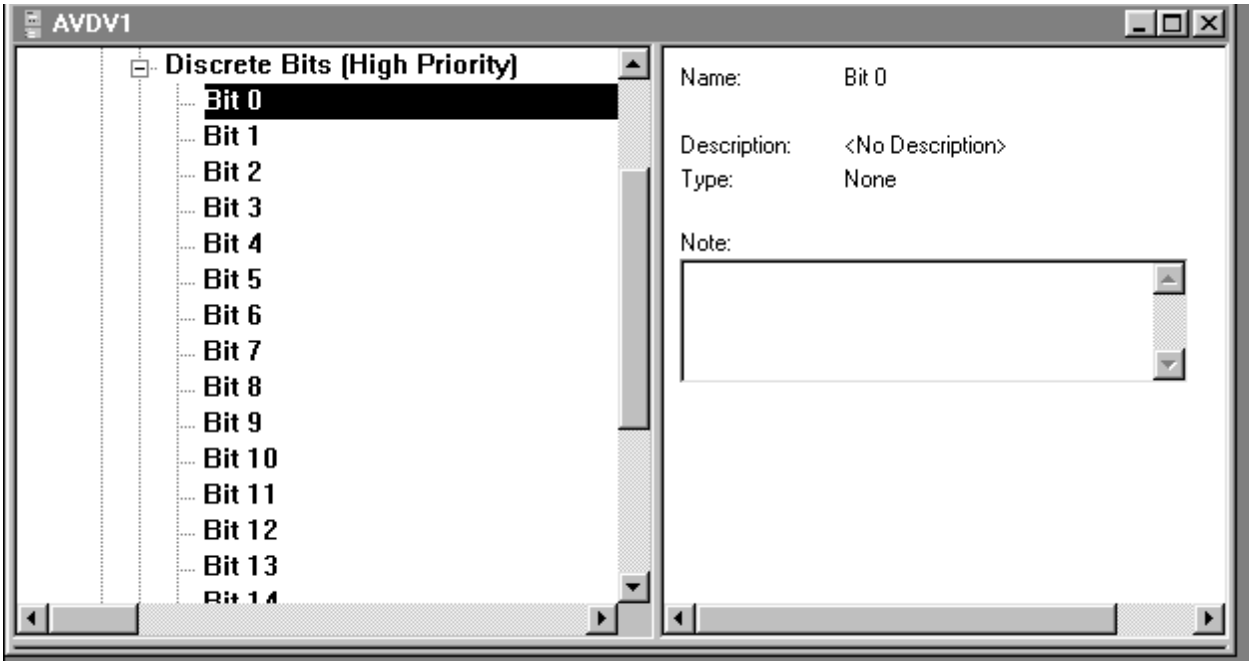


Figure 3.17

The user must now configure the bits in the high priority words that have been defined. Select the appropriate bit by double-clicking on it (or right-click on the bit and select **Modify**).

17. The following screen appears.

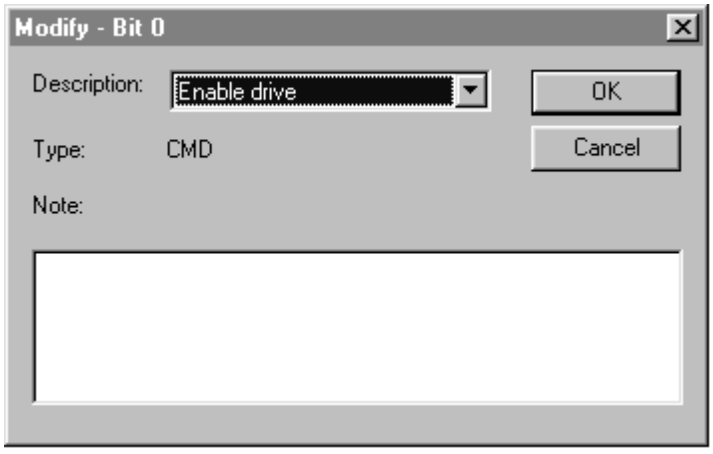


Figure 3.18

Using the pull-down menu, select a Description parameter and press **OK**. Continue the same process for other applicable bits (such as Bit #1 in this example configuration). In this configuration example, Bit #0 uses the parameter shown in Figure 3.18.

18. The following screen appears. Figure 3.19 screen depicts the status of Bit #1. In this example, the parameter select for Bit #1 is **Start/Stop**.

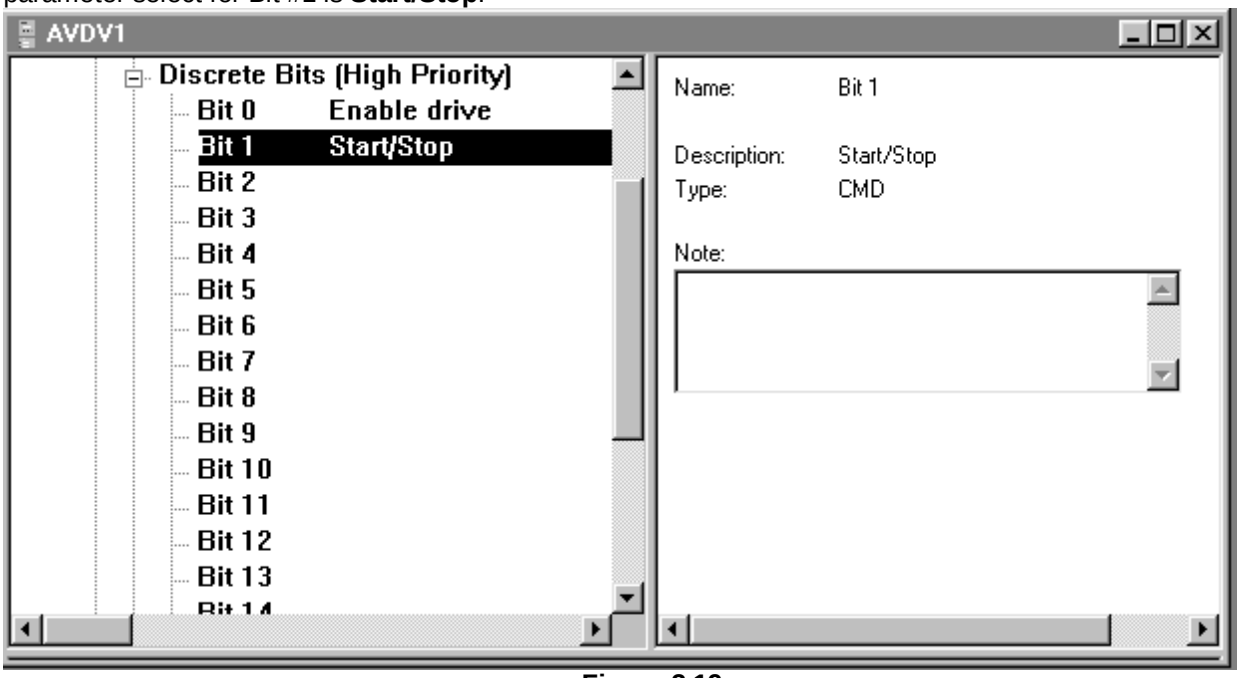


Figure 3.19

If the user decides to remove a parameter from a bit, double-click on the bit (or right-click and press **Modify**) and select **No Description** as depicted in Figure 3.20 and press **OK**.

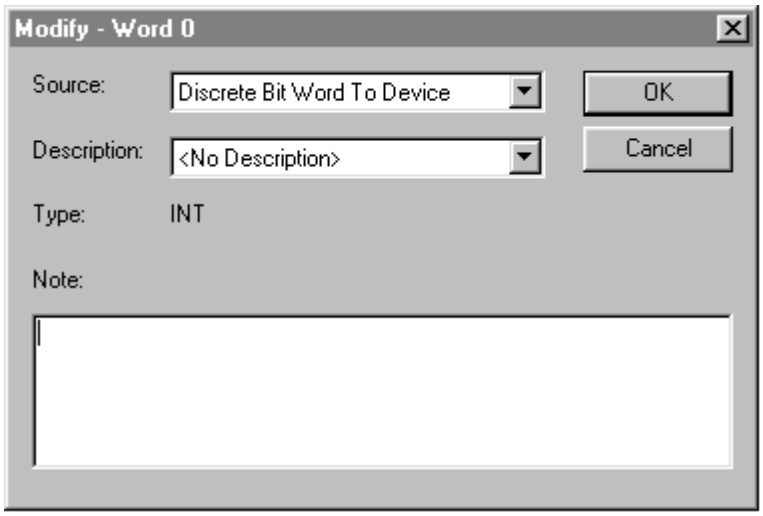


Figure 3.20

19. Put the cursor in front of the Expand/Collapse box in front of Discrete Bits (High Priority) and click. Figure 3.21 appears.

To configure the Genius Network to be compatible with the Genius Bus Controller (GBC), place the cursor in the Expand/Collapse box in front of Genius. Double-click (or right-click and press **Modify**).

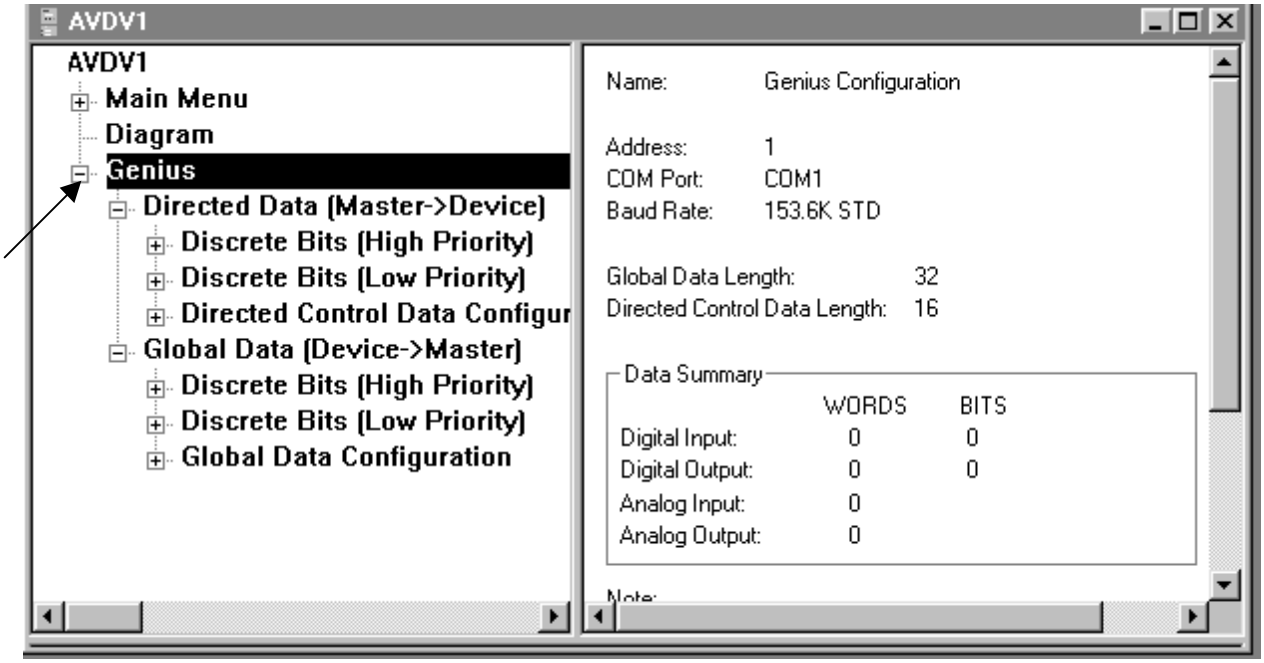


Figure 3.21

20. Select the maximum levels (as shown in Figure 3.22) using pull-down menus. The Global Data Length and Directed Data Length selection in this box is the size of the Genius data map regardless of the number of words configured. Press **OK**. Then press **Save As** to save the configuration.

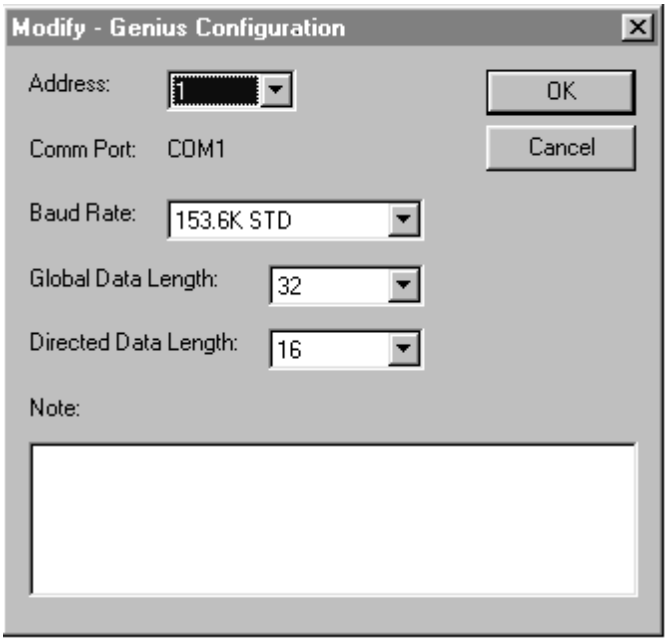


Figure 3.22

21. The following screen appears. Press **Save**.

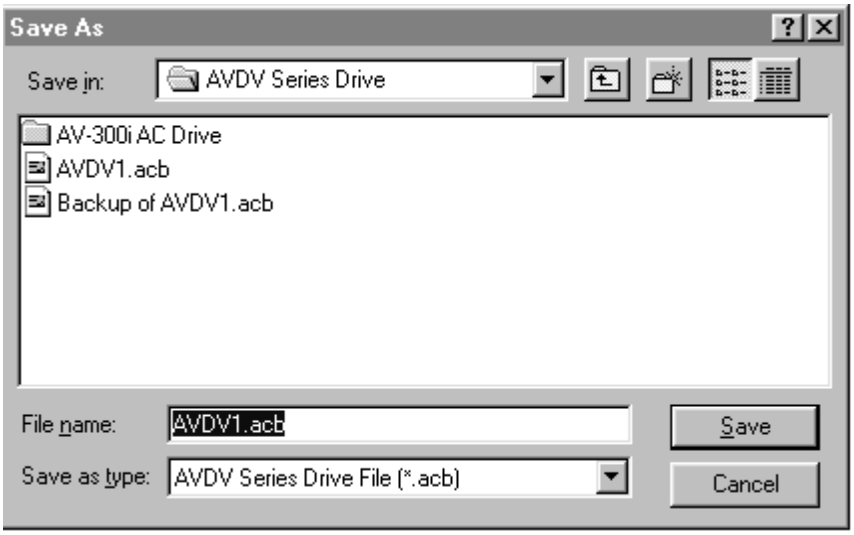


Figure 3.23

22. The following screen appears. Select **Device**, **Download Network Configuration** or **Upload Network Configuration**. A serial interface cable must be connected directly to the Genius SBI interface card.

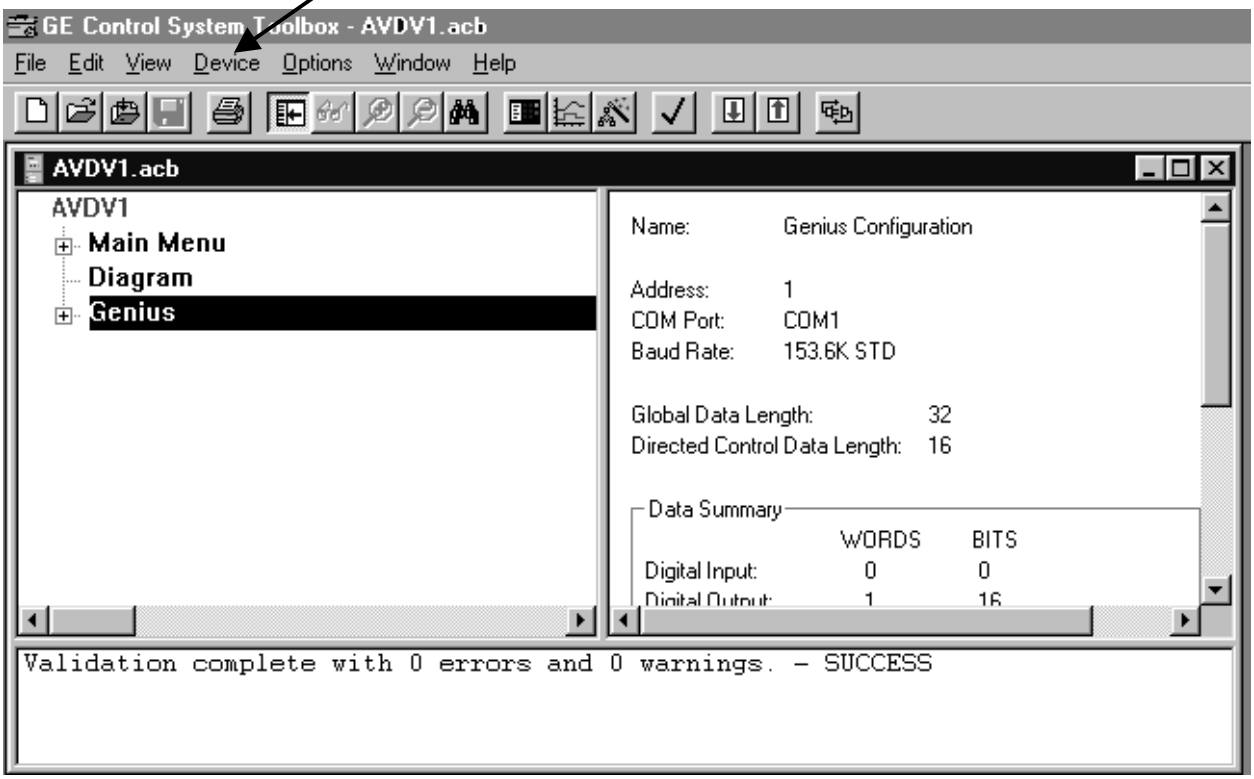


Figure 3.24

23. The screen appears. In this example, the user selected to download the program. Press **Yes**.

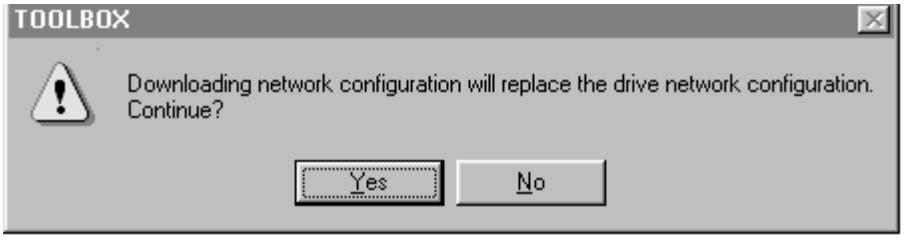


Figure 3.25

The configuration process for the GEN250/251 is completed. Section 1.3 provides a of steps to follow after this configuration is completed. It is appropriate to now configure the Genius Bus Controller (GBC) using Logicmaster 90. Using summary screen information from the GEN250/251 configuration, determine the Global Data length and the Directed Control Data length as well as baud rate and network id information. (See Chapter 5.) Afterwards, write the Ladder program, and again, refer to the summary information in the GEN250/251 configuration.

CHAPTER 4: GENIUS COMMUNICATIONS

This chapter is just a brief overview and introduction to the Genius network. It does not cover detailed information on the Serial Bus Option card or the AV-300i drives.

4.1 Introduction to Genius

Genius is a high speed token passing network which has been used in industrial applications for many years. The network supports up to 32 devices, with baud rates of up to 153.6kbaud. A wide variety of Genius devices exist which can reside on the network, ranging from intelligent I/O blocks to more sophisticated communications devices such as personal computers. In recent years a number of third party devices have emerged, including Operator Interface Units, valve manifolds, RF tag readers, etc.

In a typical industrial application, Genius devices are distributed throughout a fairly wide area, wired in a daisy chained fashion with a single shielded, twisted pair. The Serial Bus Interface Genius option card allows the AV300/DV300 Drives to be distributed on the factory floor on the same twisted pair as the I/O blocks and other Genius devices. This provides a new level of PLC integration for the drives. The physical nature of the network can allow for great savings in wiring, as many discrete wires can be replaced with a single communications cable. This allows tasks such as starting, stopping, reversing, and changing speeds to be accomplished over the LAN. In addition, drive parameters and diagnostic data previously not available to the PLC are easily accessible.

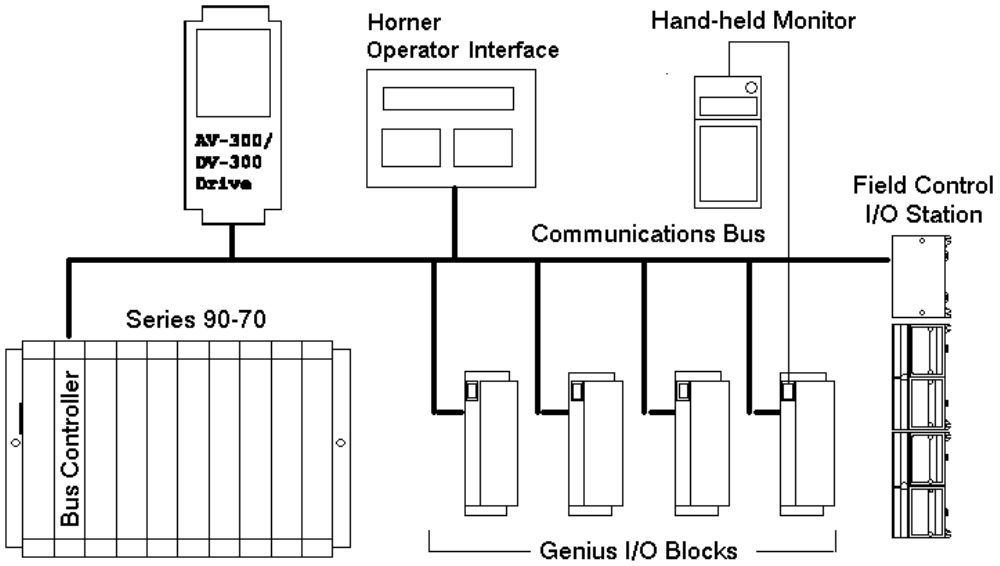


Figure 4.1. *Typical Genius Devices and Architecture*

4.2 Network Architecture

Normally, a GE Fanuc programmable controller runs the network, through a PLC module called a Genius Bus Controller (GBC). Devices (up to 32 in number) are wired in a daisy chained fashion. Network devices support four communications terminals, Serial 1, Serial 2, Shield In and Shield Out. The network is terminated at each end with an appropriate terminating resistor. The value of the resistor should be chosen to match the characteristic impedance of the cable. Refer to GE Fanuc Automation publication GFK-90486 for help in selecting an appropriate cable type for your application. Note: If the characteristic impedance of the cable is unknown, 120 ohm terminating resistors should be used.

Each of the (up to) 32 devices on the network is assigned a Genius Bus Address ranging from 0 to 31. Bus Controllers are most typically assigned a Genius Bus Address of 31. In applications with redundant bus controllers, the “backup” bus controller is address 30. Bus address 0 is normally reserved for the Genius Hand Held Monitor.

Among other tasks, the bus controller allows Genius I/O (including the drives) on the network to be mapped into PLC memory, monitoring inputs and controlling outputs. Intelligent, data intensive Genius devices also share their data with the PLC through communications with the bus controller.

4.3 Genius Communications Services

As stated previously, the Serial Bus Interface Genius option card allows the drive to reside directly on the Genius LAN, providing drive control and data access capabilities to the PLC. There are three types of communications that can occur on the Genius LAN. These are I/O Services and Global Data. The Serial Bus Interface option card supports all three of these communications types.

4.4 I/O Service

I/O Service is the manner in which data is transferred to and from Genius I/O Blocks. Outputs are selectively written to each I/O block from the CPU bus controller each scan. Many I/O blocks also broadcast inputs to the bus every bus scan.

4.5 Global Data

Global data is data broadcast over the network at large, with no particular “destination”. Each Genius device has the capacity to broadcast up to 128 bytes of global data. Intelligent devices which reside on the LAN (bus controllers, OIUs, etc.) can read this data off the network. These devices are intelligent enough to interpret this data, as the data content differs from Genius device to Genius device. Drive feedback data consists of parameters such as speed reference, torque, current, faults, function settings, etc. The Serial Bus interface allows the system designer to select which data is broadcast by the drive as global data. This is important for two reasons. First of all, the data which is desired to be monitored on a regular basis varies from application to application. Second, the amount of global data broadcast by the drive is directly proportional to response time.

In general, the procedure for configuring the drive’s Global output data is a process of mapping the global output data words to drive parameters. There are three different means in which this “mapping” of global data output words to drive parameters can be accomplished. These are; from the keypad, from the Genius Hand Held Monitor, and from the optional personal computer configuration utility. Chapters are dedicated to each of these configuration means.

CHAPTER 5: PLC CONFIGURATION

5.1 General

This chapter discusses the configuration of the PLC in Genius applications using the AV-300i drives with the Serial Bus Interface option board. As mentioned in a previous chapter, Genius LANs performing control require a Genius Bus Controller. Most GE Fanuc PLCs offer a module which acts as the bus controller. This document discusses configuration of the Series 90 PLCs -- Series 90-30 and Series 90-70.

5.2 Series 90-70 Configuration

For successful integration of the Series 90-70 GBC, the document GFK-0398, *Series 90-70 Genius Bus Controller User's Manual* is required.

Configuration of Series 90-70 PLC system requires the use of Logicmaster 90-70, the personal computer software package used for ladder logic programming and system setup. Configuration of the Genius devices residing on the LAN with Logicmaster 90-70 can not be accomplished until the Genius Bus Controller (GBC) is configured. For instructions on that process, consult GFK-0398 from GE Fanuc.

After configuration of the GBC has been completed, the Genius devices residing on the LAN may be configured by zooming into the slot containing the GBC. A Logicmaster screen similar to that below will appear:

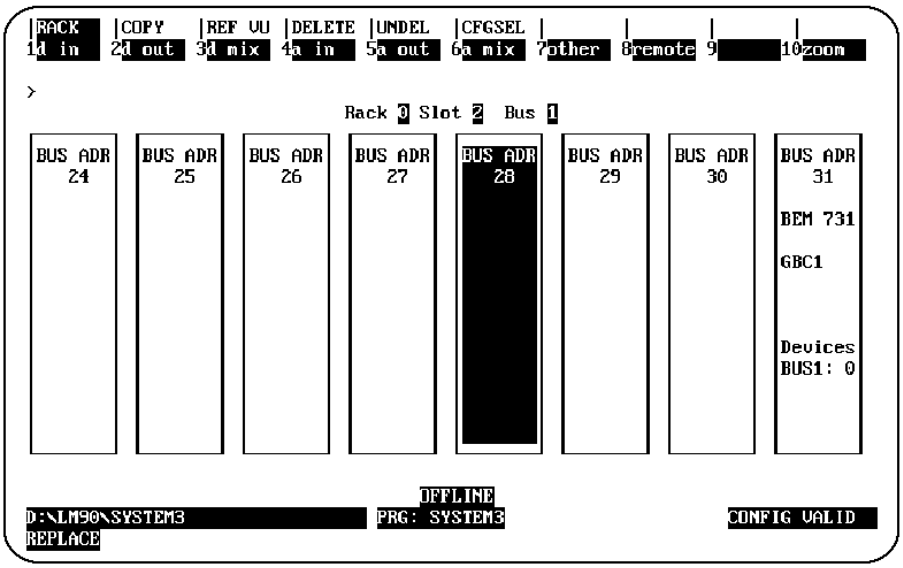


Figure 5.1 – Logicmaster 90-70 Configuration Screen

This is a representation of the Genius LAN, with each device shown as a "block". Because only eight devices can be shown on the screen at once, the screen "wraps around" from left to right. The left and right cursor keys are used to select the device to be configured. When the desired block is highlighted, the type of Genius device can be selected using the function keys. The GEN250/251is configured as a "Generic Genius I/O Device". This device is selected by pressing the "Other" (F7) function key, and selecting the "Generic I/O" device from the devices listed.

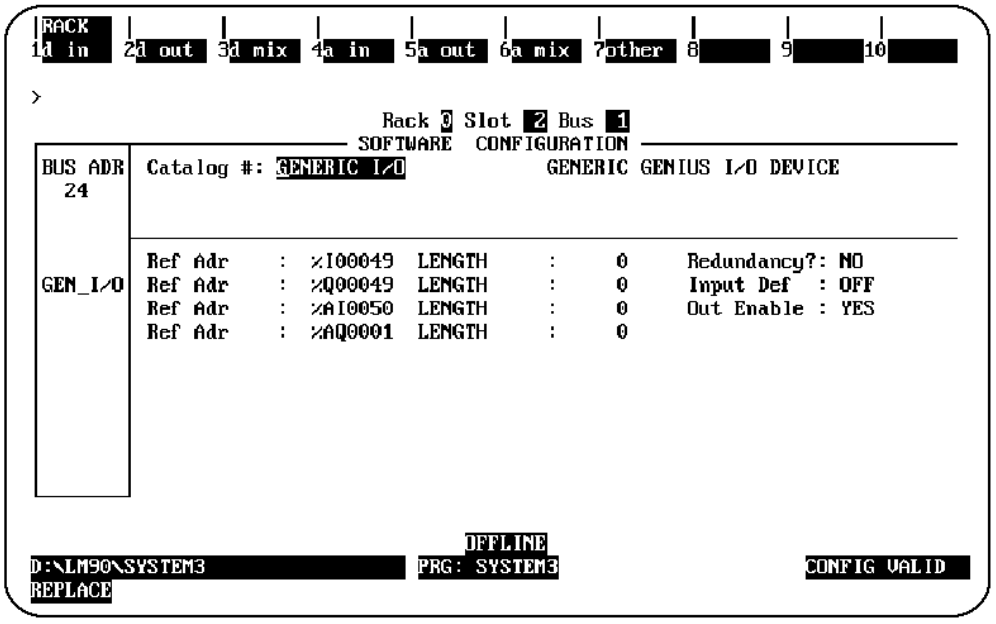


Figure 5.2. Generic I/O device Configuration Screen

Below, each configuration parameter is described. The proper setting for a drive with a default data configuration is also listed. **Figure 5.3** lists the default drive data configuration.

a. %I Length (Default = 16)

The number of %I's assigned to the drive should be equal to 16 times the number of bit-mapped global data words broadcast by the drive. Bit mapped parameters should be mapped first in the GEN250/251and defined using %Is in the PLC configuration.

b. %Q Length (Default = 16)

The number of %Qs assigned to the drive should be 16 times the number of bit-mapped directed control words (directed data). Bit mapped parameters should be mapped first in the drive and defined using %Qs in the PLC configuration.

c. %AI Length (Default = 6)

The number of %AIs assigned to the drive should be equal to the number of non-bitmapped global data words broadcast by the drive.

d. %AQ Length (Default = 1)

The number of %AQs assigned to the drive should be equal to the number of non-bitmapped directed control words.

e. Reference Addresses

In addition to the length of each of the four I/O references (%I, %Q, %AI, %AQ), the starting reference address for each I/O type must be set for each of the I/O references with a non-zero length. This reference address must not conflict with any other I/O module or Genius device.

f. Redundancy

If the AV-300i is used in a redundant application, this parameter should be set to YES.

g. Input Default

The input defaults can be set to OFF or HOLD, as desired.

h. Outputs Enabled

If outputs from the PLC are to be enabled (most cases), this parameter should be set to YES.

NOTE: The reference types available for mapping into Series 90-30 memory are more numerous than those available for the Series 90-70. This is due to the fact that the Series 90-70 performs more data type checking than the Series 90-30. This extra checking requires that the number and type of memory references match exactly in the Series 90-70. **The Series 90-30 requires only that the amount of data match exactly.**

5.3 Series 90-30 Configuration

For full information on the configuration of Genius LANs with the Series 90-30 PLC, consult the GE Fanuc's *Series 90-30 Genius Bus Controller User's Manual*.

The Series 90-30 PLC is configured using Logicmaster 90-30. In the configuration package, the Genius Bus Controller (GBC) configuration screen appears as follows:

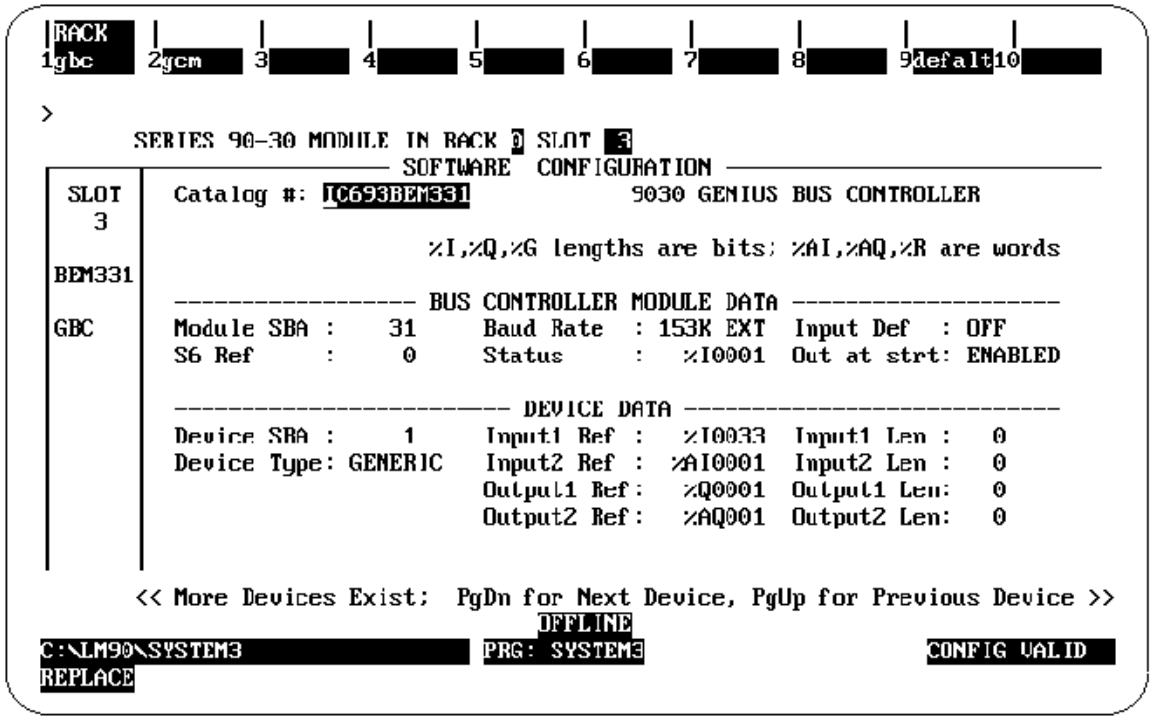


Figure 5.3. Series 90-30 GBC Configuration Screen

The devices residing on the Genius LAN are configured in the lower "Device Data" section of the screen. The cursor keys are used to navigate around the screen. When the cursor is on the "Device Data" section of the screen, the PageUp and PageDown keys are used to select the Device number. Once the proper device number is displayed for the AV-300i, the following parameters can be set.

a. Device Type

The AV-300i is configured as a GENERIC device type, which is the default.

b. Input References (Input 1 Ref, Input 2 Ref)

These parameters specify where the SBI's global data is mapped in Series 90-30 memory. Legal reference types for these parameters are %I, %G, %AI, and %R. As you can see, the global data broadcast by the GEN250/251can be divided into two different areas of PLC memory. For instance, part of the global data could be mapped into %I, and the remainder into %AI. Two non-consecutive areas of the same reference type could also be mapped. For instance, part of the global data could be mapped to %R1, and the remainder to %R500.

c. Input Length (Input 1 Len, Input 2 Len)

These parameters specify how much global data is broadcast by the SBI. If the Input Reference specified is bit-type (%I, %G), the length parameter is in bits. If the Input Reference specified is word type (%AI, %R), the length parameter is in words. The total amount of data mapped into the Series 90-30 must exactly match the total amount of global data broadcast by the SBI.

d. Output References (Output 1 Ref, Output 2 Ref)

These parameters specify where the AV-300i directed control data is mapped in Series 90-30 memory. Legal reference types for these parameters are %Q, %G, %AQ, and %R. As you can see, the directed data input by the GEN250/251can be divided into two different areas of PLC memory. For instance, part of the global data could be mapped into %Q, and the remainder into %AQ. Two non-consecutive areas of the same reference type could also be mapped. For instance, part of the directed data could be mapped to %R1, and the remainder to %R500.

e. Output Length (Output 1 Len, Output 2 Len)

These parameters specify how much directed data is received by the SBI. If the Output Reference specified is bit-type (%Q, %G), the length parameter is in bits. If the Output Reference specified is word type (%AQ, %R), the length parameter is in words. The total amount of data mapped from the Series 90-30 must exactly match the total amount of global data received by the SBI.

NOTES

CHAPTER 6: AV-300i DRIVE PARAMETERS

6.1 Drive Parameter Descriptions

The parameters and parameter numbers associated with the AV-300 and DV-300 adjustable speed drives are listed as “Pick Lists” in the software configuration tool, and can be accessed with the hand held monitor attached to the drive**.** For further information on these parameters, consult the AV-300i instruction manuals.

Due to revisions to the parameters, the parameter information is not contained in this manual. The information can be obtained from the AV-300i Instructions Manual.

The following sections explain how the AV-300 and DV-300 Manual Parameter Table relates to the Software Configuration Tool Pick Lists.

a. Directed Control Data:

This is a Genius Bus term. Directed Control Data refers to data that is automatically transferred from the PLC to the AV-300i. The AV-300I can receive up to 16 data words in this manner.

b. Global Data:

This is a Genius Bus term. Global Data refers to data that is automatically transferred from the AV-300i to the PLC. The AV-300I can transmit up to 32 data words this manner.

c. Word Parameters:

These are parameters whose data values are represented by a 16 bit numbers.

d. Bit Parameters:

These are parameters whose data values are represented by 1 bit. The only values allowed for bit parameters are zero (0 or FALSE) or one (1 or TRUE).

e. High Priority Data:

The AV-300i provides for up to 12 parameters to be declared as High Priority, 6 Directed Control Data words and 6 High Priority Global Data words. Only AV-300i parameters designated as High Priority parameters can be assigned to the high priority channel. For a complete list of the high priority parameters, refer to the AV-300i instruction parameter list. All 12 of these parameters are passed between the HE300GEN250 and the AV-300I every 2 milliseconds. To compute a typical update time the Genius bus scan time and the ladder code scan time must be added to the 2 milliseconds.

f. Low Priority Data:

All parameters that are not declared as High Priority must use the Low Priority Channel. Parameters passed on the Low Priority Channel are updated very slowly compared the High Priority data. Each of these parameters requires a minimum of 102 milliseconds to be passed between the HE300GEN250 and the AV-300i. To compute the best case update time, the Genius bus scan time and the ladder code scan time must be added to 102 milliseconds times the number of Low Priority parameters that are configured.

g. High & Low Priority Bit Parameters:

Bit parameters are divided into the following 4 categories:

High Priority Directed Control Bits, bits sent from the PLC to the AV-300i
High Priority Global Bits, bits sent from the AV-300i to the PLC,
Low Priority Directed Control Bits, bits sent from the PLC to the AV-300I and
Low Priority Global Bits, bits sent from the AV-300i to the PLC.

Up to 16 individual bit parameters can be assigned to each of these four categories. For each category that any Bit Parameters are assigned, there must be a place holder assigned in the corresponding word configuration (Directed Control Data Configuration and/or Global Data Configuration). This place holder is used to indicate were in the Genius data stream the bit data is to be placed. The GE Toolbox configuration tool calls these place holders “Discrete Bit Word” and can be assigned either High or Low Priority. Note that a High Priority Discrete Bit Word requires one of the 6 available High Priority Word positions leaving only 5 available for other Word Parameter assignments. Most applications will require both High Priority Directed Control Bits and High Priority Global Bits to be used.

CHAPTER 7: WIRING DIAGRAMS

7.1 Genius Wiring:

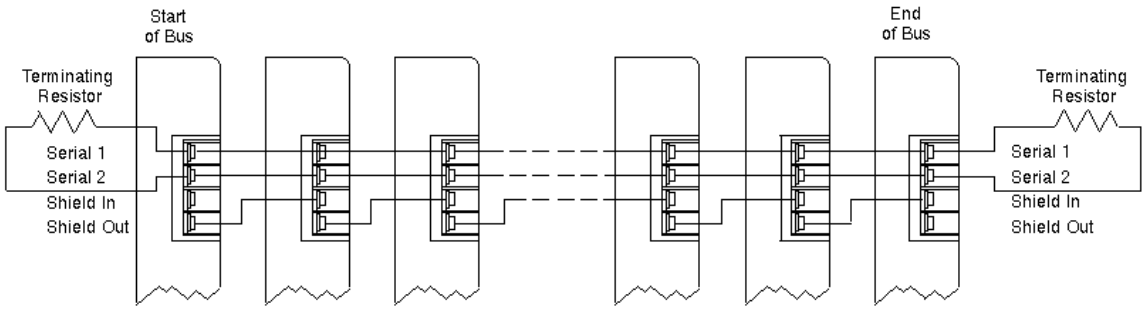


Figure 7.1. - Typical Genius Wiring Diagram

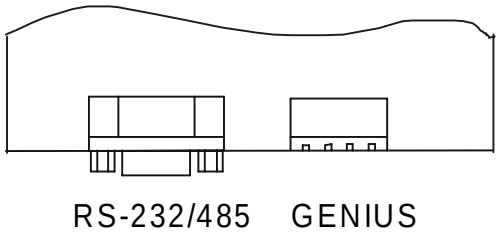
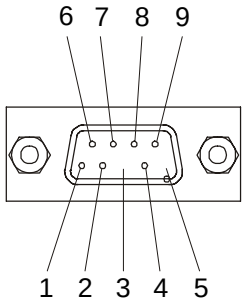


Figure 7.2. Serial Bus Interface Genius Connector

For further instruction on wiring, consult the GE Fanuc User Manual (Genius I/O Systems and Communications).

7.2 RS232/RS485 Pinout:



RECEPTACLE ASSEMBLY
CONTACT NUMBERS

RS-232 APPLICATION

CONTACT	DESCRIPTION
1	CD OUT* →
2	TXD OUT →
3	RXD IN ←
4	NO CONNECTION
5	GND
6	DSR OUT* →
7	CTS IN ←
8	RTS OUT →
9	RI OUT* →

* CONTACTS 1, 6, AND 9 ARE INTERNALLY CONNECTED IN RS-232 MODE.

RS-485 APPLICATION

CONTACT	DESCRIPTION
1	SHIELD
2	DO NOT CONNECT
3	A
4	100 OHM PULL DOWN
5	GND
6	DO NOT CONNECT
7	B
8	CONNECTED TO PIN 4
9	+5 VOLTS

The following jumpers are associated with RS485 (J2).

a. JP1 - Jumper on places a 120 Ohm terminating resistor on the circuit.

b. JP2 - Places 5 volts at J2, Pin 9. JP2 consists of six individuals headers. All headers must be placed on the right side of JP2 for RS-232 operation or placed on the left side for RS-485.

c. JP3 – Must be jumpered for RS-232 operation and must be removed for RS-485 operation.

d. JP4 – Do NOT jumper.

For more information on the hardware setup, see the GE Control Toolbox Help file.

CHAPTER 8: INSTALLATION OF GEN250/251 OPTION CARD

8.1 General

The following chapter describes the installation procedures for the GEN250 and the GEN251. The procedures differ in that the GEN250 is installed *inside* the AV-300i drive while the GEN251 is installed *external* to the drive.

8.2 GEN 250 Installation

8.2.1 Installation Hardware

Included in the packaging with the GEN250 are the following items:

a. The option card.
b. One installation kit (consisting of two metal standoffs, two plastic spacers, two Phillips head screws, four lock-washers, and one 6" telephone type cable, and one 6" 2-wire power cable.)

8.2.2 Installation Procedures

The GEN250 option card is installed inside the drive cover, so that the NEMA rating of the drive is maintained after installation of the option card.

Note: It is highly recommended that the user consult the Installation chapter and the Wiring chapter in the *GE AV-300i Drive Manual* for additional information.

1. Power down the drive.

Warning: Failure to power down the drive can result in injury or death due to electrical shock and can cause damage to equipment.

8.2.3 Cover Removal

a. Press the area on both sides of the drive to remove the lower cover as shown in Fig. 8.1.

b. Remove the control panel from the drive by pulling up *gently* and tilting the control panel. Do not use force to pull up the control panel. Then, disconnect the telephone cable connection located beneath the control panel at the panel end. (See Figure 8.1.)

c. Remove cover from the drive.

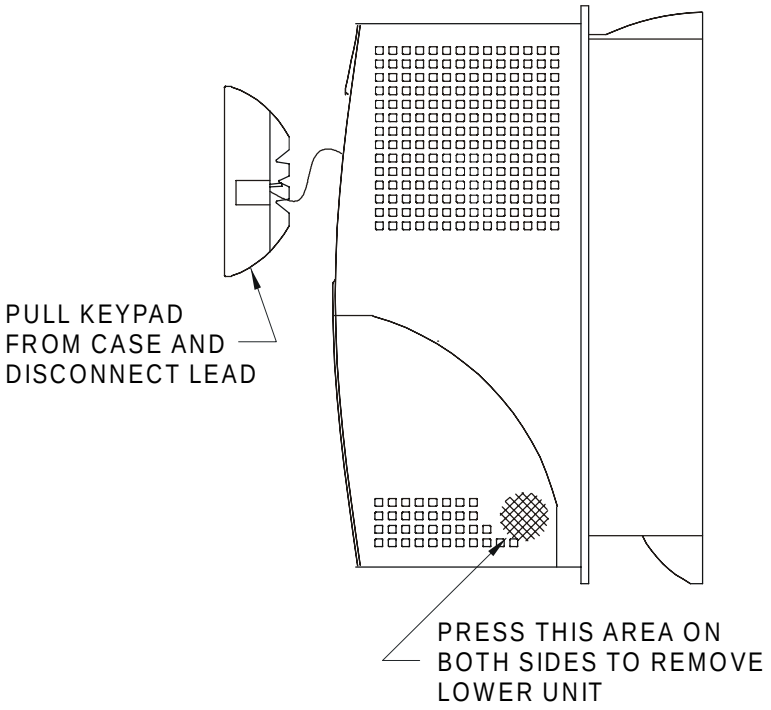


Figure 8.1 – Installing GEN250

8.2.4 Housing Removal

Note: If there is existing wiring connected in any of the four terminal blocks, unplug the terminals and leave the wiring intact. Note that three blocks are located on the regulation board (top), and one is located on the power board (bottom).

a. Remove two screws located at the front of the lower board to remove the lower panel and free the case. (See Figure 8.2.)

Note: If wired, the Protector Earth Ground connector is attached to one of the screws.

b..Refer to the following caution statement *before* performing this step. To remove the case, *carefully* separate the bottom of the housing from the heat sink casting *approximately ½ inch* to clear the two mounting bosses and the power board. *Gently* pull outward and slide upward to disengage the tabs securing the upper end of housing.

Caution: To avoid breaking off tabs, do <u>not</u> separate the bottom more than one-half inch.

The housing is now free of the base.

8.2.5 Regulation Card Removal

a. Disconnect the ribbon cable between the power card and regulation card.

b. Remove four screws securing the regulation card to standoffs and remove card. (Figure 8.2.)

c. Remove the regulation card. Lay it face down.

8.2.6 Mounting the GEN250 Card

Note: Be sure to configure the jumpers on the GEN250 card before installing it in the drive. See Figure 8.6 (for location of jumpers) and Section 7.3.

a. Screw the two threaded metal standoffs into the board on the component side. (See Figure 8.3.)

b. Then, snap the two plastic standoffs into the board on the component side.

c. Snap the two plastic standoffs into the regulation card. (Figure 8.4.)

d. Install two screws through the regulator card and into the standoffs.

e. Install the telephone jumper cable between the regulator card and the GEN250.

f. Plug the two-wire power cable into the socket on the GEN250. The left-hand wire is connected to regulator card connector point #19. The other wire goes to point #18 during re-assembly.

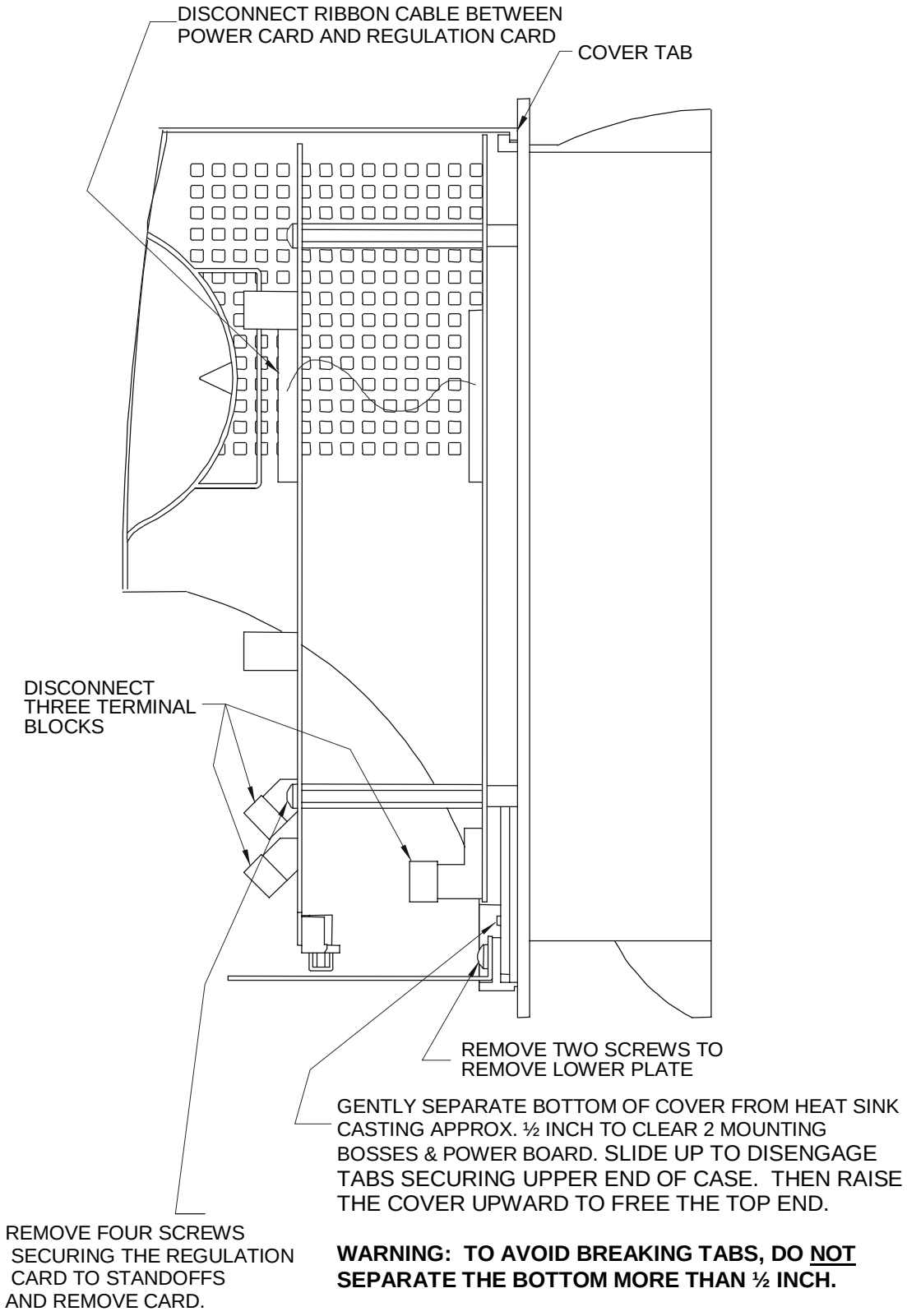

DISCONNECT RIBBON CABLE BETWEEN POWER CARD AND REGULATION CARD
COVER TAB
DISCONNECT THREE TERMINAL BLOCKS
REMOVE TWO SCREWS TO REMOVE LOWER PLATE
GENTLY SEPARATE BOTTOM OF COVER FROM HEAT SINK CASTING APPROX. ½ INCH TO CLEAR 2 MOUNTING BOSSES & POWER BOARD. SLIDE UP TO DISENGAGE TABS SECURING UPPER END OF CASE. THEN RAISE THE COVER UPWARD TO FREE THE TOP END.
REMOVE FOUR SCREWS SECURING THE REGULATION CARD TO STANDOFFS AND REMOVE CARD.
WARNING: TO AVOID BREAKING TABS, DO NOT SEPARATE THE BOTTOM MORE THAN ½ INCH.

Figure 8.2 – Installing GEN250

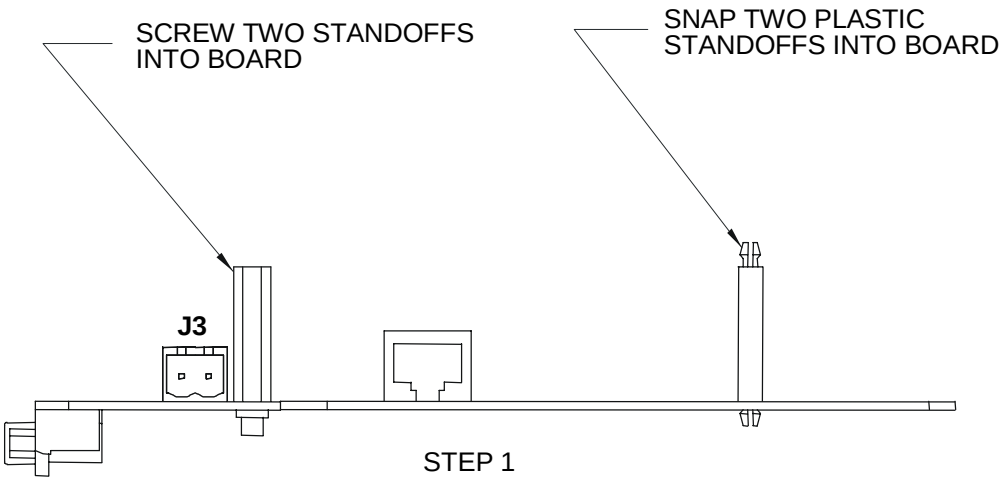


Figure 8.3 – Installing GEN250

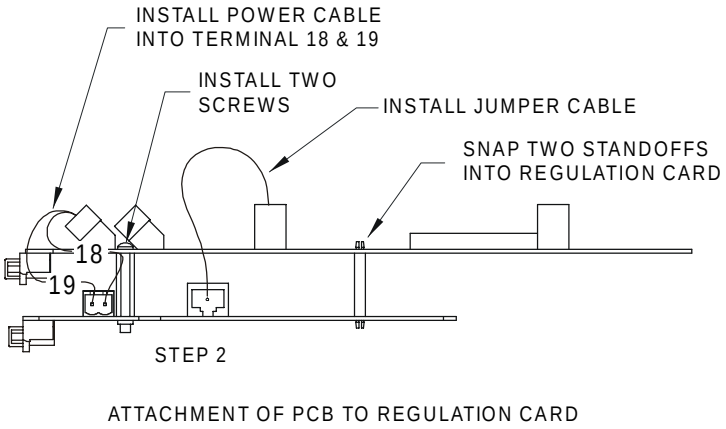


Figure 8.4 – Installing GEN250

8.2.7 Re-assembly

a. Mount the regulator card with the GEN250 attached on the four standoffs with four screws. (See Figure 8.4.)

b. Reconnect the ribbon cable between the lower power card and the regulation card. (See Figure 8.2.)

c. Replace the housing by sliding the housing tabs into the recess and slide downward until the points at the lower end are engaged over pins.

d. Reconnect the four plugs that were removed during disassembly. Connect the two wires from the GEN250 to points #18 and #19 (Figure 8.5).

e. Before replacing the lower panel, remove the two knockouts aligned with the connectors on the lower side of the GEN250 card (Figure 8.5).

f. Install two screws to hold both the lower plate and the lower end of the housing.

g. Connect the telephone cable to the back of the keypad and snap the keypad into the housing.

h. Replace cover.

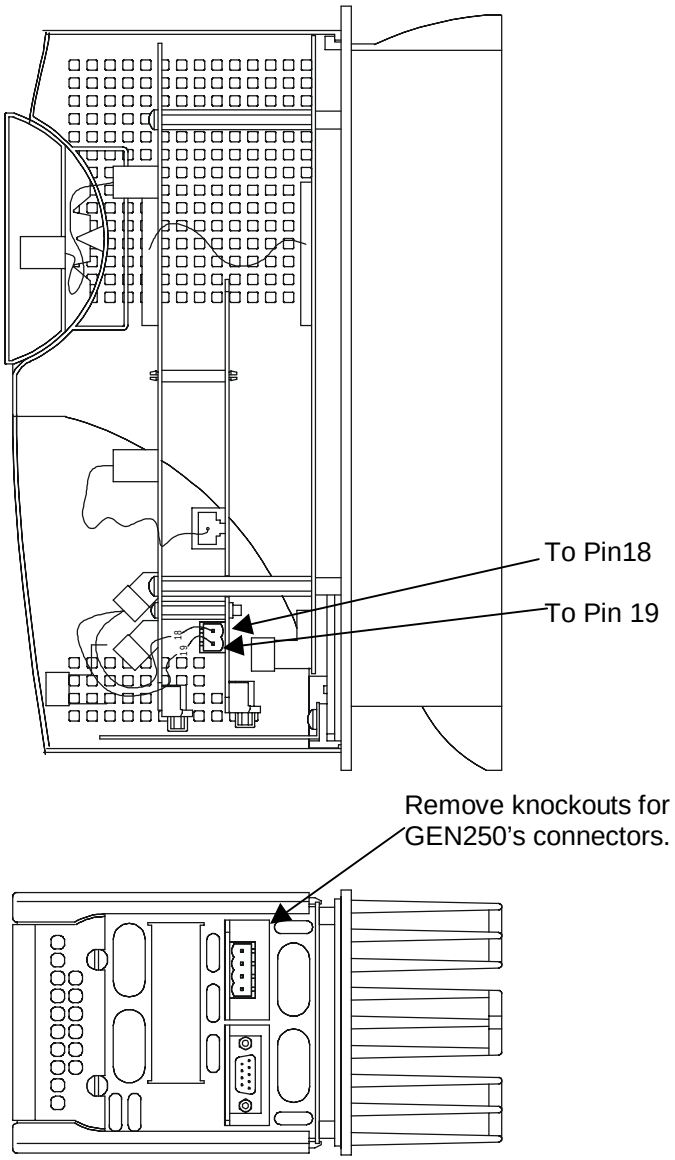


Figure 8.5 – Installing GEN250

18. Reinstall terminal plugs that were previously disconnected in Step 5. (Figure 8.5.)

19. To reinstall the plate, remove the two knockouts covering the GEN250 connectors.

20. Secure the plate with two screws.

21. Install the supplied telephone cable between the regulation card and the GEN250.

22. Plug the supplied 2-Wire power cable into the connection J3 on the GEN250. (See Figure 8.3 for J3's location.)

8.3 GEN 251 Installation

8.3.1 Installation Hardware

The GEN251 is included as part of an assembly which includes the DIN rail mounting adapter and one (1) 2- ft. telephone type cable and one (1) 2-ft. 2-wire power cable.

8.3.2 Installation Procedures

The GEN251 option card is installed external to the drive.

Note: It is highly recommended that the user consult the Installation chapter and the Wiring chapter in the *GE AV-300i Drive Manual* for additional information.

1. Power down the drive.

Warning: Failure to power down the drive can result in injury or death due to electrical shock and can cause damage to equipment.

Note: Be sure to configure the jumpers on the GEN251 card before installing it. See Figure 8.6 (for location of jumpers) and Section 7.3.

2. Mount the GEN251 assembly onto the DIN rail. (Figure 8.6.)

3. Establish a ground at one of the four mounting tabs to the DIN rail mounting brackets.

4. Remove cover of the drive. (Refer to Figure 8.1.)

5. Attach the supplied telephone type cable between the GEN251 and the regulation board. (Figure 8.7.)

Note: Pop-out the center of one of the plastic plugs from the plate and run the cable into the appropriate connection on the regulator card.

6. Plug the two-wire cable into the GEN251. Route the power cable through the knockouts that cover the GEN251 connectors and plug into Terminal pin 18 (black) and pin 19 (red). (Figure 8.7.)

7. Replace cover.

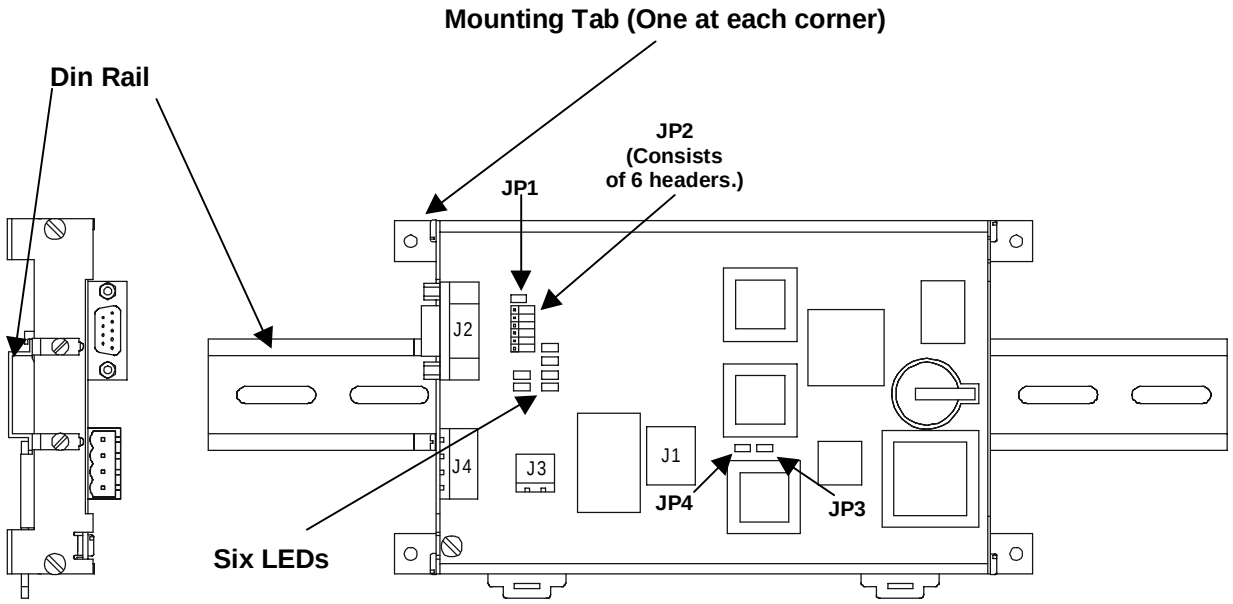


Figure 8.6 – Installing GEN251

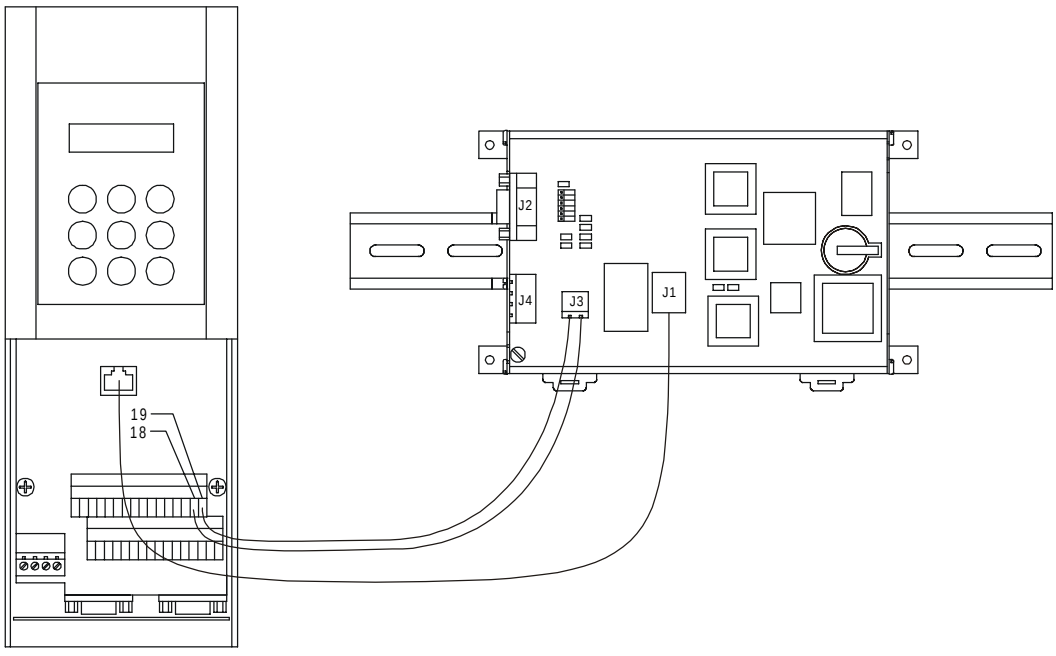


Figure 8.7 – Installing GEN251

The drive is now ready to be operated with the GEN250/251option card.

NOTES

CHAPTER 9: GEN250/251CARD LED INDICATORS

The GEN250/251card has six LED indicators for general troubleshooting. See Figure 9.1 for the location of the LED's.

1. The "Power" indicator informs the user that the GEN250/251card is getting power. If the Drive is powered up, and this light is not illuminated, ensure the ribbon cable is properly connected.

2. The "Reset" indicator is illuminated as long as the power light is illuminated. If the GEN250/251card appears to be having problems, and the reset LED is not illuminated, contact Horner APG'sTechnical Support.

3. The "Transmit" indicator flashes when data is transmitted to a PC while reading the configuration from the GEN250/251card with the software configuration tool.

4. The "Receive" indicator flashes when data is received while writing a configuration to the GEN250/251using the software configuration tool.

5. The "GENA OK" indicator is illuminated unless there is a fault with the GENA board.

6. The "COMM OK" indicator illuminates when the GENA board is communicating with the GBC properly. If the "COMM OK" LED is not illuminated after configuration, check the following:

a. Make sure the GEN250/251configuration Global Data and Directed data length matches the Summary Global Data words, and the Directed Control Data words (In the software configuration tool).

b. Make sure the Cable is wired correctly between the GBC and the GEN250/251card.

c. Check the GBC configuration (LM90 Configuration package). The Global data length, and the Directed control data length must match the input length and the output length respectively.
Serial Bus Interface LED description, and nomenclature.

Table 9.1 – LED Indicators

D1	Receive Data (Serial Port)	D4	Reset (Is OFF if unit is reset.)
D2	Transmit Data (Serial Port)	D8	GENA OK
D3	Power	D9	COMM OK

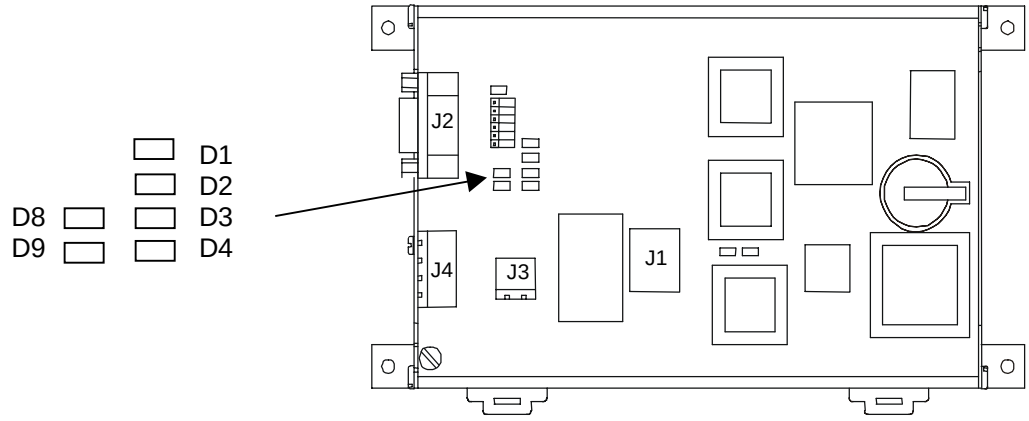


Figure 9.1 –Close-up View of LEDs